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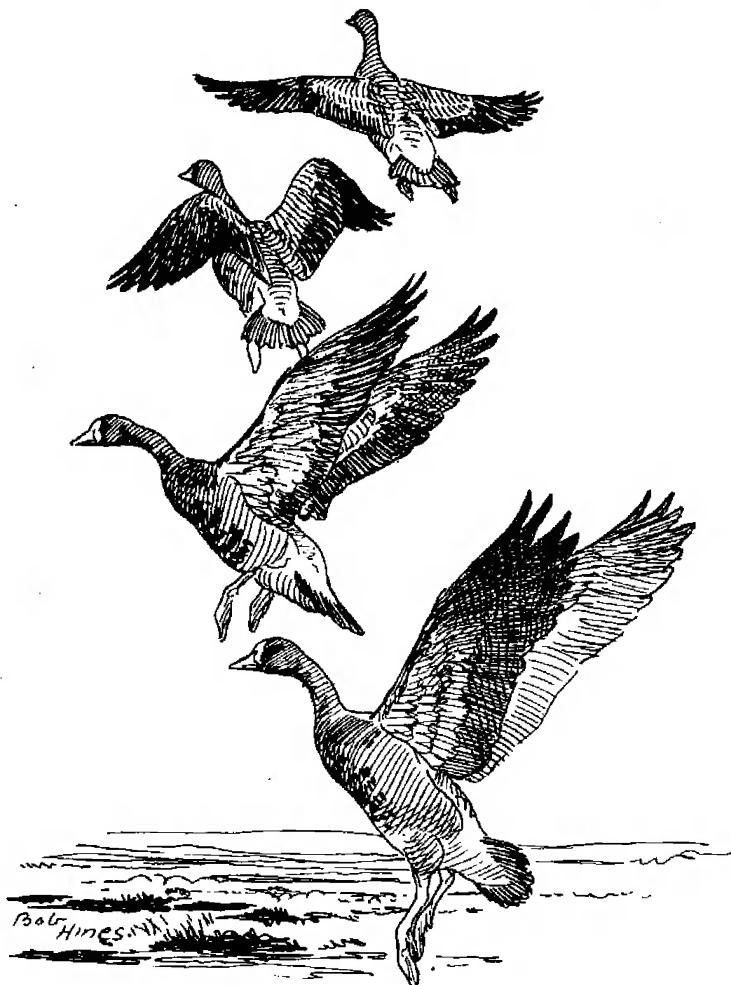
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WATERFOWL POPULATIONS AND BREEDING CONDITIONS - SUMMER 1955



Special Scientific Report - Wildlife No. 30

United States Department of the Interior . . . . . Douglas McKay, Secretary  
Fish and Wildlife Service . . . . . John L. Farley, Director

Canadian Department of Northern Affairs  
and National Resources . . . . . Hon. Jean Lesage, Minister

Canadian Wildlife Service . . . . . W. Winston Mair, Chief

Washington, D. C. - February, 1956



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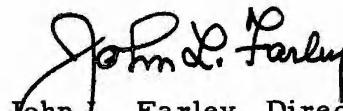
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## **FOREWORD**

This is a compilation of reports on waterfowl breeding ground conditions in 1955. It is published jointly by the Canadian Wildlife Service, the United States Fish and Wildlife Service, and many Provincial and State Game Departments. It is the ninth report in a series begun in 1947 to record annual breeding ground conditions for our migratory waterfowl.



John L. Farley  
John L. Farley, Director  
Fish and Wildlife Service



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## WATERFOWL BREEDING GROUND SURVEY IN ALASKA,

1955

Henry A. Hansen

### Introduction

Aerial transects were flown over the more important Alaskan breeding grounds for the seventh consecutive year. Based on previous experience these random transects have been modified from year to year in an effort to reduce the sampling error and to cover more adequately areas of greatest importance. Some experimenting was done in regard to width of transect censused, and a tentative re-stratification of some areas was begun, but for the most part, the breeding pair survey followed the standard pattern of past years.

Ground surveys and banding stations were operated in four areas. David R. Klein, Federal Aid biologist, conducted Canada goose banding on the Copper River Delta for the fifth consecutive year. The rate of band returns on Western Canada geese has been exceptionally high, and the Copper River Delta is the major breeding ground for this sub-species. For the third successive year a production study and banding operation was undertaken near Ft. Yukon. Two students from the University of Alaska, Eugene J. Rueter and Kenneth Hughes, operated the Ft. Yukon project.

In lieu of the Innoko River, Yukon Delta, and Lake Louise study areas operated in the past years, two new sites were established in 1955. James G. King, Game Management Agent, conducted an exploratory banding operation in the Tetlin Lake area on the eastern border of Alaska, and Peter E. K. Shepherd, University of Alaska student, established a production study and banding operation near Selawik on the Kotzebue Sound. Because of adverse conditions no ground studies were attempted at the Minto Lake station this summer. The Minto Lake project has not been abandoned, however.

### Weather and Water Conditions

The initial break-up came at an average date, but thereafter the progression of spring was much slower than normal, creating a "late" nesting season throughout southern and western Alaska. The northeastern part of the Territory followed an average phenology. The entire Minto Lake area was flooded during the break-up, and as late as July 18 the water level was still 6.6 feet above that on the same date in 1954. About 120 square miles of the lower Innoko and Iditarod Rivers were flooded also, rendering that area of little value for nesting. The Iditarod was still at flood stage late in June. Because these areas were already flooded at the beginning of spring migration and nesting attempts were precluded from the start, it is probable that at least some of the birds normally using these major breeding grounds moved into adjacent habitat to nest. Later evidence indicated this possibility. Water conditions elsewhere in the Territory were favorable for nesting.

Breeding Ground Surveys

## Aerial

Most of the low density areas included in past surveys were deleted and more intensive coverage was concentrated on the better breeding grounds in 1955. A total of 3,088 linear miles of transect (772 square miles) were flown in 1954, but only 2,368 linear miles (460 square miles) in 1955. Conversely, the sampling intensity for all units of those strata censused in 1954 averaged 0.2 percent, and for the more restricted coverage this year the sampling intensity was increased to 0.8 percent.

Two types of transects were flown. Some of the areas were covered with the standard 16-mile transect using two observers, each counting a strip one-eighth mile wide on either side of the aircraft. Other areas were censused with one observer recording a strip one-eighth mile wide only, using a dictaphone. Two observers censused four square miles on each transect, whereas the one observer using a dictaphone censused only two square miles per transect.

The dictaphone can be a great asset in recording observations from the air, but mechanical failure, unless detected immediately, can nullify the entire effort. Two such failures with different machines during the Alaska survey prompts the following recommendation to those using dictaphones in aircraft or automobiles. The power inverting unit for transforming 12 volt DC into 110 volt AC should be no less than 100 watt capacity. After considerable use a smaller inverter may still cut a dictabelt on the revolving drum without sufficient power to record audio as well.

Table 1 summarizes the breeding pair survey. The population index from all areas comparable with the 1954 census indicates a decrease of considerable extent in the Ft. Yukon and Minto Lake areas, possibly 50 percent in the former and as much as 80 to 90 percent in the latter. Substantial gains elsewhere, however, partially offset these losses so that the over-all decrease was only 10 to 20 percent.

It is of considerable interest that various phases of the Ft. Yukon study corroborate each other in indicating quantitatively the lower production. The concurrent aerial and ground censuses of breeding pairs in June showed a reduction from the 1954 population of 29 percent on the ground and 45 percent in the aerial count. A reduction in broods of 51 percent was directly reflected in 60 percent fewer ducks banded on the same area as last year with a comparable expenditure of time and effort.

The population index of 350,000 as shown in Table I is not directly comparable with the 1954 population index of 798,000. The figure from last year includes over 227,000 square miles of low density habitat in which no transects were flown in 1955. In past aerial surveys these extensive low density areas have averaged slightly more than one pair of ducks per square mile. During adverse conditions elsewhere, e.g. Minto Lake in 1955, it is conceivable that much of this contiguous habitat will absorb birds forced from other areas.

Because of the heterogeneity encountered on all of the larger breeding grounds, contours following lines of gross changes in waterfowl breeding densities are being established in re-stratifying the major habitat areas. For instance, the 25,000 square mile Yukon-Kuskokwim Delta, formerly all included in one stratum, was divided into two strata in 1955, and probably will be further modified next year. In some instances much smaller units can be practicably divided where definite lines of demarcation between varying waterfowl densities are apparent.

In addition to classifying the various breeding areas more adequately, there is a major reconciliation yet to be made between aerial counts and ground counts of the same transects. In the Ft. Yukon area, for example, the aerial count, made June 7 and 8 averaged 5.9 pair of ducks per square mile for the six transects on and near the study area. On June 8 and 9 a complete ground census of eight square miles averaged 35.5 pair per square mile. Both counts tallied the same nine species exclusive of scoters and old squaws. That the number of ducks counted from the air was considerably fewer than the total resident population was verified by the brood count later in the season. The number of broods actually counted averaged 5.8 per square mile, essentially the same as the total pairs of ducks counted earlier from the air. These figures leave no margin for unsuccessful nesters and broods missed, of which there were undoubtedly many. On the other hand, the 35.5 pair per square mile counted from the ground may be high due to duplication when birds flushed to another pond and were re-counted. A comparison of the relative abundance of the various species as tabulated in aerial and ground counts indicates that about half of the ducks are unidentified in an aerial census (Table II.). Further indications are that most of these are puddle ducks, and probably many puddle ducks are missed entirely in aerial counts, because of their drab plumage and considerable time spent on land where they are relatively inconspicuous. These observations in Alaska correlate with those from some of the intensive air-ground study areas in the Canadian prairie provinces.

Aerial brood surveys were attempted in three of the areas where ground studies were conducted, but too few broods were observed to be of value in assessing production, or in comparing results with the ground surveys.

#### Ground

Production studies indicated relatively good brood sizes on the Ft. Yukon Flats compared with the 1954 production. With the exception of pintails, brood sizes at Selawik were comparable to the Ft. Yukon data in those species tallied frequently enough for the figures to be valid. Table IV. summarizes brood data. On the Copper River, where major emphasis was directed toward goose banding, only pintail broods were observed frequently enough to compare with past years. Because it has been a common observation among some technicians on various study areas in Alaska that duck broods of age Class II and above tend to intermingle much as geese do, all age classes were averaged together in considering average brood size. Particularly with the late nesting species, too few Class III broods were observed to be of significance anyway.

After several years and in many locations waterfowl technicians have concluded that it is futile to try to determine nesting success for a given population by seeking out individual nests where predation and desertion are abnormal due to human interference. In many studies the success of those nests found is so low that if this figure were applicable to the population as a whole over a period of time, most species could not maintain themselves. Therefore, for the purpose of assessing total production success, the fate of individual nests search out has not been considered in this light.

During banding operations on the upper Selawik River drainage a white-fronted goose population of considerable extent was found. Relatively few broods were observed in the dense willow cover, but two flocks of flightless adult geese numbering 2,000 to 2,500 in each flock were counted from the air on large lakes. From the amount of grazing along several miles of stream and lake shore it was evident that many thousand more geese were resident in the area than were actually seen. Only 113 of these white-fronts were banded, but trapping sites and techniques were established so that a representative sample can possibly be banded in the future.

#### Summary and Conclusions

1. Substantial production losses on some major breeding grounds were partially offset by gains on others so that the over-all Alaskan production was probably only 10 to 20 percent lower than that in 1954.
2. A population index, as derived from aerial surveys, is undoubtedly the minimal figure acceptable under present sampling techniques in Alaska.
3. As summarized in Table V., a total of 1,488 birds of 17 species and sub-species was banded at five stations.

Table I. - Breeding Density and Population Index of Game Ducks - Aerial Survey, May 31 - June 10, 1955.

Location	Stratum	Area 'Sq. Mi.	Number of 16 Mi. Transects			Density Prs./ Sq. Mi.	Mean Index Total	Range -			Sampling Error
			1/4 Mi. Sampled	1/8 Mi.	Breeding Prs.			Prs. Per Trans.	1/4 Mi. 1/8 Mi.	1/4 Mi. 1/8 Mi.	
Innoko- Iditarod	1	520		4	8	.8	415		1-2(1)		20%
	2	1,500		12	24	4.3	6,450		4-18(14)		29%
	3	1,050		2	4	8.0	8,400		27-27(0)		
Yukon Delta	2	16,300		28	56	2.6	42,380		1-12(11)		22%
	3	9,380		7	14	8.3	77,850		7-28(21)		38%
Koyukuk	2	5,850		7	14	4.7	27,500		3-20(17)		58%
Selawik	2	2,700		3	6	4.0	10,800		5-13(8)		135%
Buckland R.	4	200		1	2	13.5	2,700				
Norton Bay	3	400		2	4	8.0	3,200		8-24(16)		
Lake Louise	2	4,030	26		104	4.8	19,350	2-40(38)			25%
Alaska Penin- sula	2	6,200	7		28	3.2	19,840	4-24(20)			56%
	3	200	1		4	8.1	1,620				
Copper R. Delta	7	300	5		20	28.7	8,610	94-147(53)			21%
Minto Lakes	3	2,050	9		36	9.7	19,885	5-37(32)			23%
Ft. Yukon Flats	3	18,370	34		136	5.5	101,000	3-41(38)			19%
Total		68,450	82	62	460	5.1 weighted	350,000	2-147(145)	1-32(31)	21%	21%

Table II. - Relative Abundance of Waterfowl - Aerial VS. Ground Counts.

Species	Percent of Total Identified *					
	Ft. Yukon Flats				Selawik	
	1954		1955		1955	
Species	Aerial	Ground	Aerial	Ground	Aerial	Ground
Baldpate	3.5	26.5	12.4	17.2	16.6	11.3
Pintail	22.6	28.5	7.3	16.8	27.7	41.0
Mallard	6.5	7.2	11.3	16.5	-	1.3
Scaup	63.9	25.5	43.4	25.6	38.7	36.7
Bufflehead	TR.	1.6	13.5	4.5	-	-
Canvasback	1.7	3.0	6.7	4.1	-	-
Goldeneye	TR.	1.1	0.6	2.1	-	-
Green-winged Teal	0.8	1.8	3.1	1.7	16.6	1.3
Shoveler	TR.	4.4	2.3	11.0	-	.9
Miscellaneous	-	-	-	-	-	6.5

\* In 1954 at Ft. Yukon 47 percent of the ducks tallied from the air were identified; in 1955, 47 percent at Ft. Yukon and 70 percent at Selawik; 100 percent were identified in all ground counts.

Table III. - Species Composition of Game Ducks - June Aerial Survey.

Location	Tallied	Ident.	Percent Composition of Birds Identified										
			Mallard	Pintail	Teal	Baldpate	Shoveler	Gadwall	Scaup	G-w.	Golden- eye	Buffle- head	Canvas- back
										G-w.			
Innoko-Iditarod	164	70	10	42	2	13	tr.	tr.	19	4	9	-	-
Yukon Delta	262	78	3	19	1	2	-	-	71	3	tr.	-	-
Alaska Pen.	96	98	7	5	5	2	-	-	72	5	2	-	-
Selawik	41	84	-	23	15	15	-	-	46	-	-	-	-
Buckland River	32	94	-	87	-	3	-	-	10	-	-	-	-
Norton Bay	32	78	-	40	4	-	-	-	56	-	-	-	-
Lake Louise	454	68	17	4	4	17	-	-	26	28	4	-	-
Copper R. Delta	606	86	29	30	3	12	3	2	17	2	1	-	-
Minto Lakes	348	95	15	10	tr.	7	2	-	51	2	8	5	-
Koyukuk	67	80	7	4	4	17	-	-	65	4	-	-	-
Ft. Yukon Flats	746	47	11	7	3	12	2	-	43	tr.	13	6	-
All Strata (% weighted)	2,848	70	8	14	3	8	1	tr.	54	4	5	2	-

**Table IV. - Brood Sizes Taken from Ground Surveys - All Age Classes.**

Species	Ft. Yukon Flats			Copper River Delta				Selawik
	1953	1954	1955	1952	1953	1954	1955	1955
Baldpate	7.2(51)	6.1(130)	6.3(217)	-	-	-	-	6.3(42)
Green-winged Teal	8.2(8)	-	-	-	-	-	-	6.4(19)
Mallard	7.4(11)	5.6(50)	6.3(40)	-	-	-	-	4.0(2)
Pintail	6.6(31)	5.3(89)	6.2(38)	5.0(4)	5.5(66)	5.5(70)	5.3(13)	4.6(52)
Shoveler	8.3(7)	-	-	-	-	-	-	-
Scaup	8.1(24)	6.4(108)	6.4(47)	-	-	-	-	6.4(87)

Table V. - Birds Banded Summer Quarter, 1955.

Species	Adult			Local			Total
	Male	Female	Not Sexed	Male	Female	Not Sexed	
<u>Geese</u>							
Western Canada	43	61	-	172	137	-	413
Lesser Canada	6	7	-	6	1	-	20
Cackling	-	1	-	-	-	-	1
White-fronted	36	34	13	15	16	-	113
<u>Ducks</u>							
Mallard	3	1	-	12	13	4	33
Baldpate	8	-	12	62	50	1	133
Pintail	27	6	1	42	46	5	127
Green-winged Teal	7	-	-	21	14	12	54
Shoveler	-	-	1	11	11	-	23
Gadwall	5	1	-	-	-	8	14
Scaup	1	13	3	97	89	12	215
Canvasback	-	-	-	5	5	-	10
Goldeneye	77	57	29	-	1	-	164
Bufflehead	-	1	16	6	1	-	24
W. W. Scoter	-	-	-	2	-	-	2
<u>Other</u>							
Whistling Swan	1	1	-	-	1	-	3
Glaucous-winged Gull	-	-	2	-	-	137	139
<u>Total Banded</u>	-	-	-	-	-	-	1,488

WATERFOWL BREEDING GROUND SURVEY IN NORTHERN ALBERTA,  
NORTHEASTERN BRITISH COLUMBIA, THE NORTHWEST  
TERRITORIES AND THE YUKON - 1955

Robert H. Smith and Everett L. Sutton

Introduction

This report covers the eighth consecutive aerial survey of waterfowl breeding populations in the Northwest Territories and Yukon Territory. Coverages of northern Alberta and northeastern British Columbia, with the exception of the Lake Claire marshes and the Athabasca Delta, have been accomplished during the past three years only.

The population surveys were begun in central Alberta on June 2 and were concluded along the Arctic coast of the Northwest Territories on June 25. Due to mechanical difficulties with the aircraft a waterfowl production survey was not attempted.

During the entire survey the writers were assisted by William G. Leitch, Chief Biologist of Ducks Unlimited.

Survey Methods

Instead of flying transects at random as in the past, an attempt was made to follow predetermined routes laid out in advance. This pattern was begun in central Alberta at latitude 54 degrees north, the routes being laid out along every degree line except where such lines coincided with the edge of charts. When this occurred a 10-minute offset was made to facilitate map reading. In general, routes lay between the eastern slope of the Rocky Mountains and the Saskatchewan boundary up to 60 degrees north latitude. From that parallel north through 62 degrees north latitude, a similar pattern was followed except that we continued east as far as could be safely flown considering the available fuel supplies and the range of the aircraft. Beyond 62 degrees north transects were arranged so as to run between fuel caches rather than attempt to follow the parallel pattern.

All waterfowl were recorded in a one-fourth mile strip by species and further broken down into pairs--single males, groups of males, and groups of mixed adults.

### Weather and Water Conditions

After a slow start in May the season turned out to be an early one with phenological advancement marked in all sections of the survey area. Throughout June temperatures were above normal, and although there was little rainfall, surface waters were in better shape than a year previously. Even though water levels in general were higher there was no evidence of flooding in the river deltas. Consequently, nesting conditions were ideal throughout the area. As evidence of an early season several broods of Class I ducklings were observed between June 4 and 19, a situation rarely noted in the far northern areas during June.

### Breeding Populations

The index population figures presented in Table I are corrected for missing hens. Hence, they are not comparable with figures presented in previous years. The percentage figures representing change in status, however, are computed on the old basis of ducks per square mile actually seen.

### Summary

Despite favorable climatic and surface water conditions, game ducks in general decreased 41 percent from 1954. This is serious enough in itself, but it also represents the fourth consecutive annual decrease in the far northern waterfowl population, the last increase being recorded in 1951. All species decreased with the exception of blue-winged teal, redhead, and goldeneye. Of these the first two are numerically unimportant except in the extreme southern portion of the survey area.

Taken by area, decreases were recorded in all except the Athabasca Delta and the Upland Tundra. The former contained a large influx of premoultинг males due to the early season, and the latter occupied a "no change" status.

Canada geese over the entire area decreased 22 percent and whistling swans decreased 36 percent. Too small a sample of white-fronted geese was obtained to be significant for that species, and the sampling pattern set up did not allow for any coverage of the colonial nesting geese.

**Table I. - Index Population Figures.**

	<b>Mallard</b>	<b>Pintail</b>	<b>Baldpate</b>	<b>G-w. Teal</b>	<b>B-w. Teal</b>	<b>Shoveler</b>	<b>Gadwall</b>
<b>Close Forest, N.E. B.C.</b>							
Area 23,642 Sq. Mi.	5,254			4,203		2,102	
<b>Close Forest Alberta Includes</b>							
<b>Athabaska Delta, Area 179,445</b>							
Sq. Mi.	214,345	44,405	107,398	48,231	10,388	17,749	2,000
<b>Close Forest N.W.T. Area</b>							
41,465 Sq. Mi.	4,878	3,794	5,962	8,672			
<b>Forest &amp; Forest Tundra</b>							
<b>Precambrian Area 29,155</b>							
Sq. Mi.	2,987			597			
<b>Forest &amp; Forest Tundra Pre-</b>							
<b>cambrarian (N. of Great Slave</b>							
<b>Lake) Area 40,332 Sq. Mi.</b>	3,118		5,456				
<b>Slave River Parklands N.W.T.</b>							
<b>Area 4,025 Sq. Mi.</b>	8,052	805	2,818	2,416		403	
<b>Precambrian Edge N.W.T.</b>							
<b>Area 7,180 Sq. Mi.</b>	3,132		5,481	1,044			
<b>Forest Tundra (W. of Pre-</b>							
<b>cambrarian Shield ) Area 98,543</b>							
Sq. Mi.	18,676	17,032	48,944	4,508			
<b>MacKenzie Delta Area 4,935</b>							
Sq. Mi.	11,702	15,847	17,797	3,169			

**Continued**

Table I. - Index Population Figures - Continued.

	Mallard	Pintail	Baldpate	G-w. Teal	B-w. Teal	Shoveler	Gadwall
Upland Tundra Area 8,655 Sq. Mi.	550	12,641	6,595				
Old Crow Flats Yukon Territory Area 1,970 Sq. Mi.	3,504	4,906	13,140	1,402		175	
Total	276,198	99,430	213,591	74,242	10,388	20,429	2,000
Percent Change from 1954	-55.3	-78.8	-38.0	-48.1	+60.1	-67.4	-63.2

**Table I. - Index Population Figures - Part 2.**

	Scaup	Canvasback	Redhead	Duck	Ringneck	Goldeneye	Ruddy duck
Closed Forest, N.E. B.C.							
Area 23,642 Sq. Mi.	169,179			1,051	84,064	1,051	
Close Forest Alberta Includes							
Athabasca Delta Area 179,445							
Sq. Mi.	205,027	9,305	27,073	14,061	53,557	30,024	1,875
Close Forest N.W.T. Area							
41,465 Sq. Mi.	43,360				2,168	542	
Forest & Forest Tundra Pre-							
cambrian Area 29,155 Sq. Mi.	27,480				1,185	1,185	
Forest & Forest Tundra Pre-							
cambrian (N. of Great Slave							
Lake) Area 40,332 Sq. Mi.	105,998				3,118	3,118	
Slave River Parklands N.W.T.							
Area 4,025 Sq. Mi.	1,208				2,013	1,610	
Precambrian Edge N.W.T.							
Area 7,180 Sq. Mi.	39,672			1,827	1,305	1,044	
Forest Tundra (W. of Pre-							
cambrian Shield) Area 98,543							
Sq. Mi.	369,012				3,864	33,488	
MacKenzie Delta Area 4,935							
Sq. Mi.	64,607				488	1,950	

Continued

Table I. - Index Population Figures - Part 2. - Continued.

	Scaup	Canvasback	Redhead	Duck	Ringneck Bufflehead	Goldeneye	Ruddy Duck
Upland Tundra Area 8,655							
Sq. Mi.	31,877						
Old Crow Flats Yukon Territory							
Area 1,970 Sq. Mi.	26,706	18,746				7,884	
Total	1,084,126	28,051	27,073	16,939	151,762	81,896	1,875
Percent Change from 1954	-58.6	-67.9	+11.9	-70.1	-44.8	+44.1	-36.3

Table I. - Index Population Figures - Part 3.

	Scoter	Old Squaw	Merganser	Total Game Ducks	Percent Change
<b>Close Forest, N.E. B.C. Area 23,642 Sq. Mi.</b>	84,064			266,904	- 73
<b>Close Forest Alberta (includes Athabaska Delta Area 179,445 Sq. Mi.)</b>	21,560		14,061	785,438	- 37
<b>Close Forest N.W.T. Area 41,465 Sq. Mi.</b>	8,672		4,878	69,376	- 69
<b>Forest &amp; Forest Tundra Precambrian Area 29,155 Sq. Mi.</b>	20,909	597	11,848	33,434	- 27
<b>Forest &amp; Forest Tundra Precambrian (N. of Great Slave Lake) Area 40,332 Sq. Mi.</b>	64,690	7,015	11,691	120,808	- 27
<b>Slave River Parklands N.W.T. Area 4,025 Sq. Mi.</b>				19,325	- 66
<b>Precambrian Edge N.W.T. Area 7,180 Sq. Mi.</b>	8,091		4,698	53,505	- 67
<b>Forest Tundra (W. of Precambrian Shield) Area 98,543 Sq. Mi.</b>	245,342	71,484	19,320	495,524	- 38
<b>MacKenzie Delta Area 4,935 Sq. Mi.</b>	40,958		975	115,560	- 18
<b>Upland Tundra Area 8,655 Sq. Mi.</b>	123,660	16,488	19,786	51,663	No Change
<b>Old Crow Flats Yukon T. Area 1,970 Sq. Mi.</b>	47,654	5,081	526	76,463	- 15
<b>Total</b>	665,600	100,665	87,783	2,088,000	- 41

<b>Percent Change from 1954</b>	No Comp. Data	No Comp. Data	No Comp. Data	-41
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## WATERFOWL BREEDING GROUND STUDIES IN BRITISH COLUMBIA, 1955

R. H. Mackay

### Introduction

Ground and aerial surveys of waterfowl breeding areas, comparable to those made in previous years, were carried out in British Columbia in 1955. R. H. Smith, U. S. Fish and Wildlife Service, C. Kebbe, Oregon State Fish and Game Department, and the author covered the Cariboo, Chilcotin, Prince George, and Rocky Mountain Trench regions using the U. S. Fish and Wildlife Service's Grumman Goose N-749. Ground surveys in the Cariboo, Kamloops, Okanagan, and Upper Columbia Valley regions were made by the author. Banding operations were carried out for the eighth successive year in the Cariboo region by research students from the University of British Columbia and the author. Young trumpeter swans were color-banded for the second year on their breeding grounds in the vicinity of Grande Prairie, Alberta.

### Weather

The winter of 1954-1955 in British Columbia was quite mild and precipitation normal. The spring and early summer were cool and wet, and the delayed run-off caused some anxiety over floods during a hot spell in early June. However, the cooler weather which followed permitted a gradual run-off and flooding did not reach serious proportions. Lakes and sloughs were well filled throughout the summer, and conditions were favorable for breeding waterfowl.

### Methods

Methods of ground survey used this year were similar to those used in previous years. However, the extent of the survey was somewhat limited, owing to the fact that the author carried out the ground survey alone and also participated in the aerial survey.

Methods of aerial survey were again modified this year when a sample almost twice as large as any made previously was obtained. In past years it has been customary to fly one random transect on each heading, and then move farther on and fly another. The flying time between transects was not utilized for sample counts by this method. This year the transects were divided into 18-mile segments. In some cases one heading was followed through several consecutive segments; in other cases, when approaching terrain unsuitable for aerial survey, the heading was changed at the start of a new segment of the transect. In this manner it was possible to utilize a larger part of the flying time for sample counts, and thus obtain a larger sample of the water population.

Breeding Population Trends

The ground survey in the Cariboo Parklands was carried out from May 30 to June 3. The total number of ducks counted was up about 10 percent over 1954, and was about the same as in 1953. The waterfowl population has remained fairly constant on the Cariboo study lakes over the past five years. The drop recorded last year may have been real, or may have been due to various factors--different personnel or earlier survey. No appreciable change in species numbers is apparent this year except for the bufflehead which almost doubled in numbers over 1954. Comparative spring counts for the Cariboo Parklands are listed in Table I. Only one brood, five goslings with a pair of Canada geese, was recorded throughout the Cariboo survey.

Table 1. - Comparative Counts - Cariboo Parklands - Spring, 1946-1955\*

Species	1946	1947	1949	1950	1951	1952	1954	1955
Canada Goose	-	-	-	-	-	2	-	11
Mallard	39	35	10	35	61	107	43	45
Pintail	12	15	1	19	10	18	20	25
Baldpate	73	56	13	28	53	41	38	31
Gadwall	-	-	-	-	-	2	2	6
G-w. Teal	7	19	2	5	11	19	-	10
B-w. Teal	-	-	-	-	31	12	2	3
Shoveler	5	9	2	5	12	15	12	11
Redhead	12	28	32	32	37	32	30	22
Ringneck	3	7	-	-	2	-	-	11
Canvasback	21	17	25	20	31	11	26	28
L. Scaup	403	457	155	476	241	205	247	221
Goldeneye	57	116	66	136	142	175	157	117
Bufflehead	79	100	30	117	89	95	72	130
Ruddy Duck	31	42	28	59	92	91	92	82
Unidentified	-	-	-	-	-	11	-	75
Total Ducks**	742	901	364	932	812	834	741	817
Total Coots	447	167	35	170	154	107	201	139

\* With the exception of 1948 and 1953.

\*\* Total ducks includes Canada goose count.

The aerial surveys of the Cariboo, Chilcotin, Prince George and Rocky Mountain Trench regions of British Columbia were carried out from May 14 to May 24, 1955. As explained earlier, the methods of obtaining the aerial sample were modified somewhat this year and a larger sample was obtained. Table II compares the waterfowl population indices over the past

five years computed on the basis of the number of ducks observed per square mile. The total areas of the various regions were approximated by means of a planimeter by D. A. Munro. Included in Table II are population indices for 1955 as figured by methods outlined in "Instructions for Conducting 1955 Aerial Waterfowl Surveys in the Southern Portions of Alberta, Saskatchewan and Manitoba", issued by the U. S. Fish and Wildlife Service April 5, 1955. The number of birds per square mile of aerial sample is down in all areas this year. This may be explained by the inclusion of more barren areas in the larger sample this spring. However, it is the opinion of the author that the method, used for the first time this year, of recording the sample, not only by species but by pairs, single drakes, flocked drakes, and flocked birds of mixed sexes, may have been partially responsible for the lower count. The time taken to segregate and record the various components of the population caused a time lag in the survey, and some birds were probably missed on this account.

**Table II. - Population Indices From Aerial Surveys.**

	<u>1950</u>	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1955</u>	<u>1955 *</u>
<b>CARIBOO (4,500 Square Miles)</b>						
Sample Area (Square Miles)	22.5	28.4	25.0	35.0	45.0	45.0
Ducks Per Square Mile	11.5	13.5	7.7	14.5	9.0	
Canada Goose (Total Seen)	14	14	13	8	2	
Population Indices	51,800	60,800	34,600	65,100	40,600	56,000
<b>CHILCOTIN (6,000 Square Miles)</b>						
Sample Area (Square Miles)	29.5	30.0	27.5	43.3	78.0	78.0
Ducks Per Square Mile	14.6	19.7	14.9	11.0	6.3	
Canada Goose (Total Seen)	5	18	4	33	23	
Population Indices	87,500	118,000	89,100	66,000	37,900	48,900
<b>PRINCE GEORGE (3,500 Square Miles)</b>						
Sample Area (Square Miles)	28.3	29.3	22.5	20.0	40.0	40.0
Ducks Per Square Mile	2.1	0.8	2.8	5.6	1.6	
Canada Goose (Total Seen)	4	2	-	6	4	
Population Indices	7,400	2,800	9,800	19,600	5,600	7,000
<b>TOTAL POPULATION INDICES</b>	<b>146,700</b>	<b>181,600</b>	<b>133,500</b>	<b>150,700</b>	<b>84,100</b>	<b>112,500</b>

\* New method

Table III. - Aerial Surveys - Cariboo, Chilcotin, Prince George Areas - Spring, 1955.

	CARIBOO	CHILCOTIN	PRINCE GEORGE	TOTAL
Total Area	4,500 Sq. Mi.	6,000 Sq. Mi.	3,500 Sq. Mi.	14,000 Sq. Mi.
Sample Area	45 Sq. Mi.	78 Sq. Mi.	40 Sq. Mi.	163 Sq. Mi.
Ponds/Sq. Mi.	2	1.2	1.2	1.4
Ducks Counted	407	511	63	981

	% SPP. Comp.	Pop. Indices						
Mallard	23	12,800	36	17,700	27	1,900	27.8	32,400
Pintail	-	-	15	7,400	1	-	8.5	7,400
Baldpate	10	5,800	14	6,500	5	350	12.3	12,650
G-w. Teal	1	400	1	600	5	350	1.4	1,350
Shoveler	-	-	1	300	-	-	.6	300
Ringneck	-	-	-	-	3	200	.3	200
Canvasback	1	800	-	-	-	-	.7	800
L. Scaup	17	9,400	10	5,100	30	2,100	15.4	16,600
B. Goldeneye	17	9,400	7	3,400	20	1,400	12.2	14,200
Bufflehead	31	18,000	16	7,900	10	700	21.2	26,600
<b>TOTAL</b>		<b>56,600</b>		<b>48,900</b>		<b>7,000</b>		<b>112,500</b>

Comparative data gathered during aerial survey of the Rocky Mountain Trench are tabulated in Table IV. These figures represent approximate total counts for that portion of the Rocky Mountain Trench from the south end of Columbia Lake north to Moberly. A drop of about five percent in the Canada goose population is indicated this year. The number of ducks recorded was also down about 40 percent.

Table IV. - Aerial Survey - Rocky Mountain Trench.

	1950	1951	1952	1953	1954	1955
Ducks Per Sq. Mi.	19.9	10.1	12.0	19.5	26.2	15.2
Canada Geese Per Sq. Mi.	20.1	17.4	19.7	25.3	19.0	18.0
Canada Goose	1,612	1,395	1,575	2,025	1,528	1,445
Snow Goose	-	-	-	-	12	-
Whistling Swan	2	10	1	1	29	64
Mallard	773	402	445	576	309	412
Baldpate	167	83	155	103	115	152
Green-winged Teal	24	-	15	-	2	12
Blue-winged Teal	83	7	-	-	28	-
Canvasback	27	3	-	10	8	-
Scaup	18	9	53	3	143	70
Goldeneye	79	97	65	91	69	42
Bufflehead	2	21	9	18	75	10
Others	49	33	88	49	47	43
Unidentified	376	135	130	705	1,275	476
TOTAL DUCKS	1,598	790	960	1,555	2,071	1,217

Time and personnel did not permit extensive ground surveys in the Kamloops, Okanagan, and Columbia Valleys this year. However, it was possible to obtain counts on eight sloughs in the Beresford area near Kamloops. The results of this survey are given in Table V. No comparable figures for past years are available.

Table V. - Beresford Sloughs, Kamloops Area, June 3, 1955.

Mallard	25	Ring-necked Duck	2
Pintail	24	Lesser Scaup	39
Baldpate	13	Goldeneye	21
Gadwall	3	Bufflehead	2
Blue-winged Teal	1	Ruddy Duck	14
Shoveler	9	Unidentified	45
 Total Ducks			198

Information on Canada goose nesting was obtained from islands in Vaseaux Lake and near Wilmer in the Columbia Valley. A total of 39 nests were found on Hatfield's Island in Vaseaux Lake on May 3. A second visit to the island on June 4 indicated that 179 goslings had been successfully hatched there.

The island near Wilmer was visited on April 29, and 24 nests, containing 121 eggs, were counted. This island was visited again on June 24, and a successful hatch of at least 70 goslings was indicated. Nine nests had been flooded after the hatch, and evidence of success or failure was therefore lacking. However, it is very probable that several of these nests were successfully hatched.

#### Production

Production in British Columbia was again delayed by the cool, damp spring. The first broods were observed near Kamloops on June 3, when two broods of 10 and 12 Class I mallards were seen.

Mid-summer counts were carried out on the Cariboo study areas from July 26 to 29 this year. Information obtained from these counts is compared in Table VI with that obtained in previous years.

Table VI. - Mid-Summer Counts, Cariboo Parklands.

	1954		1955	
	Adult	Young	Adult	Young
Mallard	15	25	45	45
Baldpate	11	33	11	55
Pintail	1	-	35	-
Gadwall	-	-	5	17
Green-winged Teal	14	16	50	15
Blue-winged Teal	27	-	8	-
Shoveler	-	-	2	3
Redhead	13	41	30	75

Continued

Table VI. - Mid-Summer Counts, Cariboo Parklands (Continued).

	1954		1955	
	Adult	Young	Adult	Young
Canvasback	9	12	1	10
Lesser Scaup	298	43	243	228
Goldeneye	63	141	101	148
Bufflehead	43	66	56	114
Ruddy Duck	56	25	44	29
Unidentified	108	-	305	3
 Total	658	402	936	752
American Coot		205	69	165

A successful breeding season in the Cariboo Parklands was indicated this year by the increase in the numbers of both young and old birds seen, as compared to 1954.

A summary of the brood data from all areas is given in Table VII. Brood averages of both pond and diving ducks were up this year over last.

Table VII. - Summary of Brood Data.

	Pond Ducks		Diving Ducks	
	1954	1955	1954	1955
Mallard	5.6(32)	7.5( 6)	Redhead	5.5(19)
Gadwall	6.0( 3)	8.5( 2)	Canvasback	4.7( 3) 10.0( 1)
Pintail	5.5(18)	-	Lesser Scaup	7.3( 7) 8.8(26)
Green-winged Teal	8.0( 2)	5.0( 3)	B. Goldeneye	6.5(43) 6.0(12)
Blue-winged Teal	5.0( 3)	-	Bufflehead	5.9(14) 7.6(11)
Baldpate	6.3(11)	6.1( 9)	Ruddy Duck	5.6( 8) 7.2( 4)
Shoveler	5.5( 6)	1.5( 2)		
Total	5.8(75)	6.1(22)	Total	6.1(94) 7.3(68)

Banding

Included in Table VIII is a list of the waterfowl banded in the Cariboo region by the field party from the University of British Columbia and the author. Banding operations were carried out from August 2 to 10, 1955. Many downy scaup had to be released without bands because of their size.

Thirty cygnets and one adult trumpeter swan were banded with colored plexiglass bands in addition to the ordinary aluminum bands. This banding was done by the writer with the assistance of D. A. Munro and B. Hamm of the Canadian Wildlife Service, and M. T. Myers of the University of British Columbia, in the Peace River Parklands area near Grande Prairie, Alberta.

Table VIII. - Birds Banded in Cariboo - 1955.

	<u>Banded</u>	<u>Recaptures</u>		<u>Banded</u>	<u>Recaptures</u>
Pintail	5	-	Bufflehead	22	-
Baldpate	41	-	W-w. Scoter	1	-
B-w. Teal	1	-	Ruddy Duck	4	-
Redhead	102	-	Horned Grebe	21	-
Lesser Scaup	77	5	Eared Grebe	28	3
B. Goldeneye	278	3	American Coot	1	-
Total	504	8		77	3

#### Summary

Aerial and ground surveys, somewhat modified from those of previous years, were carried out in British Columbia again this year.

A cool, wet spring delayed the breeding season. Water conditions were favorable for waterfowl throughout the season.

The number of ducks recorded during the spring ground survey in the Cariboo showed a slight increase over 1954. Numbers recorded during the aerial survey show a decrease but, owing to changes in survey technique, figures this year are not strictly comparable to those obtained previously.

Numbers of Canada geese in the aerial survey of the Upper Columbia Valley in the Rocky Mountain Trench were down about five percent from 1954. Nest surveys indicate a successful goose-breeding season in the south Okanagan and Columbia Valley regions.

Mid-summer production surveys showed that the hatch this year was somewhat delayed, but that the numbers of both young and old birds had increased over those of 1954. Brood averages were also up this year.

A total of 581 waterfowl were banded in the Cariboo region this year. Thirty-one trumpeter swans were banded in the Peace River Parklands near Grande Prairie, Alberta.

## AERIAL WATERFOWL BREEDING GROUND SURVEY - ALBERTA, 1955

Allen G. Smith and G. Hortin Jensen

### Introduction

The 1955 Alberta waterfowl survey was conducted with the following objectives in mind: (1) to supply the Waterfowl Regulations Committees of Canada and the United States with forecasts of the production and fall flights of waterfowl; (2) through intensive ground surveys to provide basic ecological information for better interpretation of data obtained from extensive aerial surveys, and to provide a better understanding of the mechanics of producing waterfowl; and (3) to band a representative sample of young waterfowl prior to the opening of the waterfowl season for the purpose of obtaining information on hunting pressures, mortality rates, and distribution.

Aerial breeding pair and brood surveys were flown with a Cessna 170, piloted by G. H. Jensen, with Allen G. Smith acting as observer. Ground studies as well as comparative air-ground breeding pair and brood surveys were conducted on the same four intensive study areas that were set up in 1953. The personnel and areas involved are listed below:

- Area 1. - (Brooks-Suffield) - Fred Sharp, Ducks Unlimited (Canada)
- Area 2. - (Strathmore) - George Freeman, Ducks Unlimited (Canada)
- Area 3. - (Lousana) - Kenneth Diem, U. S. Fish and Wildlife Service,  
and John Stelfox, Alberta Game Branch.
- Area 4. - (Vermilion) - Harry Webster, Robert Harris and Ralph Orvis,  
Canadian Wildlife Service.

Two regular banding crews were organized and began operations in early July. They were composed of the following men: W. Ashton Brann, James Birch and Richard Droll of the U. S. Fish and Wildlife Service, Roger Schmitke, and Charles Jenkins of the Alberta Game Branch, Robert Holland, Wisconsin Fish and Game Department, Thomas Berkley and James Sieh, Iowa Fish and Game Department, and A. E. Naylor, California Fish and Game Department. Banding was also carried on by the crew of Study Area 4 and to a limited extent by those on Area 3.

### Survey Methods

Breeding pair and production indices were obtained for the Province of Alberta by means of aerial surveys. Methods of observation were the same as outlined in Waterfowl Populations and Breeding Conditions, Special Scientific Report No. 27 with a few exceptions. Information relative to weather (winds, clouds and/or precipitation), ground speed and time were kept for each ten minute segment (18 miles) of each aerial transect during both breeding pair and brood surveys. A further breakdown of birds into pairs, single drakes, flocked drakes and flocked birds of mixed sexes was also kept in each segment.

The number and location of all aerial transects in all strata has been identical in 1952, 1953, 1954 and 1955.

#### Weather and Water Conditions

The 1955 waterfowl breeding season began under most excellent conditions as far as waterfowl were concerned. The water index was the highest recorded during the years of these surveys. In only one relatively narrow belt in the central prairies was water scarce. As the season progressed two adverse factors tended to lessen the total waterfowl production of the province. The effects of both of these factors, a heavy, wet snow in May and a lack of precipitation in June were felt most severely on Stratum C and southern districts of Stratum A. It became apparent during the brood survey that the May storm, coupled with a warm, dry June and July had practically wiped out any possibility of a normal hatch in Stratum C. The water present in early May, in this area, disappeared rapidly and by early July, only the permanent ponds remained. Production in this area was practically non-existent except in a few permanent areas on the prairies. Even on the Milk River Ridge, which is usually one of the best producing districts within this stratum, the heavy snowfall and cold temperatures associated with its higher altitude wiped out the early nesting effort. Some renesting occurred of a very restricted nature, but the area's capabilities were never approached in 1955.

A marked deterioration of water conditions throughout the Province followed the dry warm weather of June and July. Even the effects of general rains in early July were offset by the high temperatures which followed. In spite of poor reproductive results in Stratum C, waterfowl were highly successful in Strata A and B because of the excessive amounts of water present May 1.

Table I. -Water Areas on Aerial Transects, May and July, 1955.

	Stratum A		Stratum B		Stratum C		Province	
	May	July	May	July	May	July	May	July
Total Ponds Seen	4827	2598	4750	2457	1015	349	10592	5404
Ponds Per Sq. Mi.	18.33	9.87	24.83	13.00	11.87	4.08	19.03	10.05
Loss or Gain		- 46.1%		- 47.6%		- 65.6%		- 47.2%

#### Breeding Population Trends

An over-all provincial gain of four percent in the waterfowl breeding population index over 1954 is not in itself significant and might be considered as approximately the same population as that of last year. Stratum-wise, a slight decrease occurred in the prairies (Stratum A), possibly accounted for by poor water conditions in areas of generally high populations. Greatly improved water

conditions in Stratum C was reflected in the 18 percent increase of waterfowl populations there. Pintails, mallards, gadwall, baldpate and redheads showed the greatest gain in this area. In the parklands the most apparent increase occurred among the pintails and scaup. The pintail population rose particularly in areas where they were sparsely found before. This is especially true along the extreme northern edge of the parklands.

Table II. - Comparison of Aerial Waterfowl Population Indices, 1954-1955.

	Strata A		Strata B		Strata C		Province	
	1954	1955	1954	1955	1954	1955	1954	1955
Total Area Sq. Mi.	22088	22088	26100	26100	16112	16112	64300	64300
Sample Area Sq. Mi.	526.5	526.5	378.0	382.5	162.0	171.0	1066.5	1080.0
Total Ducks Seen	28518	26800	14966	16824	3278	4082	46562	48184
Total Ducks Per Sq. Mi.	54.16	50.90	39.56	43.96	20.23	23.87	39.59	41.31
Total Pairs	14259	13400	7483	8412	1639	2041	23381	24092
Total Pairs Per Sq. Mi.	27.08	25.45	19.79	21.98	10.11	11.98	19.87	20.65
Pop. Index in Ducks	1196402	1124279	1033366	1147396	326020	384526	2555788	2656184
Pop. Index in Pairs	598201	562140	516683	573698	163010	192268	1277894	1328092
Percent Change	- 6.0%		+ 11.0%		+ 17.9%		+ 3.9%	

Table III. - Species Composition of Breeding Population - Aerial.

Species	1954		1955	
	Pairs Per Square Mile	Percent of Total Population	Pairs Per Square Mile	Percent of Total Population
Mallard	7.1	35.8	7.1	34.3
Pintail	5.5	27.8	5.7	27.6
B-w. Teal	1.3	6.4	1.6	7.7
G-w. Teal	0.6	2.3	0.4	1.9
Gadwall	0.4	1.9	0.5	2.2
Baldpate	1.3	6.5	1.3	6.3
Shoveler	1.3	6.5	1.3	6.2
Redhead	0.3	1.7	0.4	2.1
Canvasback	0.4	2.0	0.3	1.6
Scaup	1.5	7.4	1.8	8.8
Ruddy	0.1	0.5	0.1	0.6
Bufflehead and				
Goldeneye	0.1	0.6	0.1	0.6
Cinn. Teal	Trace	Trace	0.0	0.0
Ringneck	0.0	0.0	Trace	Trace
Total	19.87	100.0	20.3	100.0

Considering the province as a whole, the mallard population showed no change though it is still definitely the most prevalent species. Pintails, though they declined in numbers about 12 percent on the prairies, made an over-all gain of three percent when all strata are considered, to occupy the second position in species composition. Not since 1951 and 1952 has this species been in first place as far as total population indices are concerned. The scaup, third most prevalent species in Alberta, followed by the blue-winged teal, each show population increases of about 25 percent. Species with measureable losses are represented by species with lower total numbers. Basically, however, no serious change appears to have taken place among any of the species, even among those which declined.

#### Success of the Season

The 1955 waterfowl production in Alberta surpassed that of any year since our aerial surveys began. Several factors were responsible. The breeding population was approximately the same as in 1954. A normal season with pintails and mallards beginning to nest in late April and sufficient early spring rains to cut agricultural disturbance to a minimum increased the quality of the first hatch. It is true that nest losses were high in the parklands because of excessive predation, but this was overcome to some extent by a strong and early renesting effort.

Much of the production of both prairies and parklands was due to the early hatch as evidenced by the fact that 90 percent of all observed broods during the brood survey were either Class II's or III's. A great many flying juveniles were noted throughout the Province. Of the Class I and small Class II broods identified the bulk were of the late nesting puddler or of the divers' species.

Table IV. - Aerial Production Data, 1954-1955.

	Stratum A		Stratum B		Stratum C		Province	
	1954	1955	1954	1955	1954	1955	1954	1955
Area Sq. Mi.	22088	22088	26100	26100	16112	16112	64300	64300
Sample Sq. Mi.	263.25	263.25	184.5	189.0	85.5	85.5	533.25	537.75
Tot. Brds. Seen	1349	1592	605	1030	96	46	2050	2668
Brds/Sq. Mi. "	5.12	6.05	3.28	5.45	1.12	0.54	3.37	4.96
Est. No. Birds								
Seen	113091	133632	85608	142245	18045	8700	216744	284577
Pot. Later Brds.	214	212	172	353	41	72	427	637
Pot. Brds. Per Sq. Mi.	0.81	0.81	0.93	1.87	0.48	0.84	0.78	1.18
Pot. Later.Brd.	17891	17891	24273	48807	7734	13534	49818	80232
Tot. Ind. Brds.	1563	1804	777	1383	137	118	2477	3305
Brds. Per Sq. Mi. Ind.	5.93	6.86	4.21	7.32	1.60	1.38	4.15	6.11
Est. No. Brds. Ind.	130982	151524	109881	191052	25779	22235	266642	364811
Avg. Brd. Size	5.59	5.68	5.78	6.42	5.25	5.00	5.64	5.94
Est. No. Yng.	732189	860656	634912	1226553	135340	111175	1503861	2198384

Production in Stratum C was very poor, in fact water loss was so great as to reduce production possibilities to a minimum. Evidences of a later hatch (pairs and lone males) in July would be of some value in increasing the fall flight from this area. Nevertheless, habitat conditions were of such a nature that little confidence can be placed in such a possibility. Successful broods were appreciably smaller in Stratum C than in strata to the north and total production was over 13 percent below that of 1954 and about 50 percent below the average.

Extreme southern portions of Stratum A were also affected by the drought but the general excellence of conditions elsewhere in the stratum, brought total production to a point about 16 percent above that of 1954, and 40 percent above the average. Brood sizes increased to 5.68 (in Stratum C, 5.00) and late summer observations indicated that the primary cause for the success of production on the prairies was the successful first nesting.

The most successful hatch occurred in the parklands, Stratum B. Brood sizes averaged 6.42 per brood, a strong late hatch, particularly of divers was indicated, and water, though receding because of the dry summer, was in plentiful supply for any late broods.

Hail losses were of a very minor nature in 1955, a fact directly related to the continued flow of warm dry air over the region during June, July and August. Losses of nests to predators in the parklands was apparently related to the absence of new vegetation during the period of early nesting. There losses did occur, however, so early in the season that a major renesting effort brought broods off at a time which might still be considered normal phenologically for mallards, pintails and canvasbacks.

#### Summary

The waterfowl breeding population index for the Province of Alberta in 1955 was equal to that of 1954, the highest in the history of our aerial surveys. The broods index was appreciably higher than in any former year. Losses of nests due to heavy May snows and June and July drought in Stratum C cut production in the south severely. More ideal weather conditions in Strata A and B were sufficient to offset high nest losses to predators, thus allowing for one of the most successful waterfowl seasons that Alberta has had since the drought of 1949-1950.

#### Banding

Two banding crews entered the field in early July, combining their efforts later in the season as conditions warranted. Personnel comprising these crews were under the field leadership of James Birch and W. Ashton Brann of the U. S. Fish and Wildlife Service and the men were all employees of the Federal, Provincial or State Game Departments.

Except for the first week of the banding period, the season was free of rain and travel relatively easy for the crews. Concentration of banding efforts were directed toward juvenile mallards; however, adults and young of other species were banded where caught.

Table V. - Summary of Waterfowl Bandings in Alberta, 1955 \*.

Species	Adults			Local			Grand Total
	Male	Female	Total	Male	Female	Total	
Mallard	63	49	112	268	242	510	622
Pintail	173	190	363	548	463	1,011	1,374
Gadwall	0	2	2	105	129	234	236
Baldpate	3	4	7	258	195	453	460
Blue-winged Teal	465	112	577	786	514	1,300	1,877
Green-winged Teal	53	26	79	95	51	146	225
Shoveler	5	6	11	286	324	610	621
Redhead	0	0	0	8	14	22	22
Canvasback	1	1	2	1	6	7	9
Scaup	1	5	6	74	75	149	155
Ring-necked duck	2	0	2	5	4	9	11
Ruddy	0	0	0	0	1	1	1
Coot	0	Ad. 3	3	0	Loc. 29	29	32
Total	766	398	1,164	2,434	2,047	4,481	5,645

\* In Table V, above, are included 773 waterfowl banded by Messrs. Webster, Dzubin, Harris and Orvis, all of the Canadian Wildlife Service. These birds were banded in and around the Vermilion district (Area IV) and on Saskatoon Lake near Grand Prairie, Alberta.

**WATERFOWL BREEDING GROUND SURVEYS OF SPECIAL  
STUDY AREAS IN ALBERTA - 1955**

Allen G. Smith

Introduction

The intensive ground study areas in Alberta were established with the following objectives in mind: (1) the evaluation of aerial methods, and (2) a continuation of the population dynamics studies for the purpose of obtaining a better understanding of the factors affecting waterfowl production.

Description of the Areas

A general description of the study areas including their soil characteristics and vegetative aspects was included in Waterfowl Populations and Breeding Conditions, Summer 1952, Wildlife No. 21, and will not be repeated in this report.

Personnel and Methods

The four study areas established in 1953 were the subject of further study in 1955. The areas and the biologists assigned to each are listed below:

Area 1 - Brooks to Suffield (bald prairie) - Fred Sharp, Ducks Unlimited (Canada)

Area 2 - Calgary-Strathmore (cultivated prairie) - George Freeman, Ducks Unlimited (Canada)

Area 3 - Lousana-Elnora (dense parkland - lightly grazed and/or cultivated) - Kenneth Diem, U. S. Fish and Wildlife Service and John Stelfox, Alberta Game Branch.

Area 4 - Vermilion (dense to open parkland, moderate to heavy use for grazing and grain crops) - Harry Webster, Robert Harris and Ralph Orvis, Canadian Wildlife Service.

Aerial surveys of all study areas were made by G. H. Jensen and Allen G. Smith.

The data contained in this report is a summarized compilation of the field work of the ground crews listed above. Without the fine cooperation and hard work of these men our ground studies would have been impossible. The biologists assigned to Areas III and IV were resident on the areas in question, while the biologists working on Areas I and II made periodic visits to the areas as necessary for gathering breeding pair, nesting and brood information. Due to the drought conditions in southern Alberta this summer, no ground studies were necessary on

Area I after the month of June.

The methods of conducting the study this year were identical with those described in the report, Waterfowl Populations and Breeding Conditions, Summer, 1953, Wildlife No. 25.

#### Weather and Water Conditions

The opening of the 1955 breeding season found water conditions in Alberta generally above normal. When the reserve moisture of the fall of 1954 is added to the spring precipitation of 1955, the Province, on May 1, showed an all-round moisture condition 147 percent of normal or 47 percent above average. At the same period in 1954, Alberta moisture conditions were only 91 percent of normal or 9 percent below the average, ending the season only two percent below average. Thus, fall rains, winter snows and spring rains (1954-1955) had brought about a near ideal situation as far as breeding waterfowl were concerned by May 1 of the present year. All study areas showed increases in pothole numbers and water levels over the previous year. In the parklands, (Areas III and IV), water levels were exceptionally high. Fringe vegetation, such as aspens and willows were often flooded, giving an atoll-like appearance to many water areas.

As the season progressed, the effects of a dry and warm June, July and August were felt markedly on the prairies; and to a lesser degree, in the parklands. Area I lost all water except that resulting from spillage of the local irrigation system. Area II, in the northwestern prairies, lost 51 percent of its water, a somewhat abnormal condition because of its proximity to the foothills where precipitation is usually rather high. Table I, below, illustrates the survival of potholes in each study area and the percentage of loss throughout the season. An over-all loss up to 50 percent has not been found to be serious and may even be considered normal. The losses on Area I (94 percent) however, mean a near complete failure of waterfowl production, including a movement of adult birds from the area.

Table I. - Pothole Survival.

Study Area	May	June	July	August	Loss
I	54	41	3	3	94%
II	100	95	64	49	51%
III	206	197	185	167	19%
IV	218	181	151	134	39%
Total	578	514	403	353	39%

Weather conditions were generally ideal for nesting and brooding ducks in Alberta during the 1955 season. Plentiful water in May and a dry, warm summer made for ideal conditions in all but extreme southern areas (Strata C) where a heavy, wet snow in mid-May caused a depletion of the nests of its restricted waterfowl population. As this storm was followed by dry weather and rapid deterioration of the surface water, this portion of Alberta provided little to the fall flight from the Province. Nonetheless, its lower waterfowl populations and minor importance to the over-all Provincial production, even in good years, did not seriously affect the total production for the Province.

Due to the constant flow of warm, dry air over the western prairies, almost no hail damage occurred within the Province this summer. Hail storms were very infrequent and those that did materialize were generally of a very local nature and not particularly severe.

#### Breeding Populations

As in 1954, at least two beat-outs to ascertain breeding pair populations were made on each of the four study areas. These were run in mid-May and early June. On all areas except III, the peak breeding population was recorded in the May beat-out. In the case of Area III, an influx of mallards and blue-winged teal in late May resulted in an appreciable increase in total population, enough, in fact, to reduce the over-all loss to five percent when compared to the 1954 population. Mid-May breeding pair losses in 1955 were 10 percent in all areas except IV where the population was the same as in the previous year.

Tables II and III below record population changes in May and June of 1955, a comparison of these populations in May of 1954 and 1955, and the species composition of all study areas in 1955.

Table II. - Breeding Populations - All Study Areas.

Date	Area I (4.875 Square Miles)								
	Total Ducks	Pairs	Lone ♂'s	Lone ♀'s	Ind. Pop.	Ducks/Sq. Mi.	Pairs/Sq. Mi.	Ind. Ducks	Pop. Per Sq. Mi.
May 1955	229	50	127	2	358	46.9	36.7		73.4
June 1955	166	34	98	0	264	34.0	27.0		54.1
May 1954	300	101	98	0	398	61.5	40.8		81.6

## Area II (6.25 Square Miles) \*

Date	Total Ducks	Pairs	Lone ♂'s	Lone ♀'s	Ind. Pop.	Ducks/Sq. Mi.	Pairs/Sq. Mi.	Ind. Ducks Per Sq. Mi.
May 1955	654	218	215	3	872	104.6	69.8	139.5
June 1955	619	175	268	1	888	99.0	71.0	142.1
May 1954	439	120	199	0	638	140.5	102.0	204.1

\* Total area doubled in 1955 by addition of other side of highway.

## Area III (3.625 Square Miles)

Date	Total Ducks	Pairs	Lone ♂'s	Lone ♀'s	Ind. Pop.	Ducks/Sq. Mi.	Pairs/Sq. Mi.	Ind. Ducks Per Sq. Mi.
May 1955	683	245	176	17	876	188.4	120.8	241.6
June 1955	734	270	180	14	928	202.5	128.0	256.0
May 1954	811	322	154	13	978	223.7	134.9	269.8

## Area IV (6.375 Square Miles)

Date	Total Ducks	Pairs	Lone ♂'s	Lone ♀'s	Ind. Pop.	Ducks/Sq. Mi.	Pairs/Sq. Mi.	Ind. Ducks Per Sq. Mi.
May 1955	728	256	195	21	944	114.2	74.0	148.1
June 1955	723	252	205	14	942	113.4	73.8	147.7
May 1954	766	296	165	9	940	120.2	73.7	147.5

Table III. - Species Composition of Breeding Population - All Study Areas.

Species	Area I			Area II			Area III			Area IV		
	Tot.	Prs./ Prs.	% Sp. Sq. Mi.	Tot.	Prs./ Prs.	% Sp. Sq. Mi.	Tot.	Prs./ Prs.	% Sp. Sq. Mi.	Tot.	Prs./ Prs.	% Sp. Sq. Mi.
			Comp.			Comp.			Comp.			Comp.
Mallard	48	9.8	26.8	69	11.0	15.8	148	40.8	33.8	157	24.6	33.3
Pintail	98	20.1	54.7	199	31.8	45.6	20	5.5	4.6	47	7.4	10.0
Gadwall	0	-	-	6	1.0	1.4	9	2.5	2.1	15	2.4	3.2
Baldpate	5	1.0	2.8	44	7.0	10.1	24	6.6	5.5	54	8.5	11.4
B-w. Teal	2	0.4	1.1	29	4.7	6.7	68	18.8	15.5	69	10.8	14.6
G-w. Teal	1	0.2	0.6	8	1.3	1.8	31	8.6	7.1	24	3.8	5.1
Shoveler	11	2.3	6.2	29	4.7	6.7	1	0.3	0.2	13	2.0	2.7
Redhead	-	-	-	-	-	-	15	4.1	3.4	13	2.0	2.7
Canvasback	-	-	-	-	-	-	13	3.6	3.0	25	3.9	5.3
Scaup	14	2.9	7.8	49	7.9	11.2	72	19.9	16.4	46	7.2	9.7
Goldeneye	-	-	-	-	-	-	10	2.7	2.3	0	-	-
Bufflehead	-	-	-	-	-	-	11	3.0	2.5	4	0.6	0.8
Ruddy duck	-	-	-	3	0.4	0.7	9	2.5	2.1	5	0.8	1.1
Ringneck	-	-	-	-	-	-	4	1.1	0.9	-	-	-
Cinn. Teal	-	-	-	-	-	-	3	0.8	0.7	-	-	-
Unidentified	-	-	-	-	-	-	-	-	-	3	-	Trace
Total	179	36.7	100.0	436	69.8	100.0	438	120.8	100.0	472	74.0	100.0

Nesting

The nesting season began in late April and early May and was uninterrupted by weather this year, except in the southern areas as noted above. No nest data of value was collected from either Area I or II, but in the parkland areas a total of 203 nest histories were kept.

One hundred and thirty-two nests were located on Area III. Seventy-seven or nearly 60 percent of these were mallard and scaup nests. The average clutch size increased in 1955 as did the nest success. Nest losses dropped appreciably raising the nest success to 45 percent as compared to 31 percent in 1954. This condition seems to have been general throughout the Province, if the superior hatch from a population equal to or slightly below that of last year is any criterion. On Area III, the eggs in the various clutches were tested for incubation by the floatation method. After establishing the date of hatching, no further visits were made to the nests until the predetermined hatching date. In nearly all cases this method proved its accuracy and the observers confined themselves to two visits to each nest; one, when it was found, the second, when the eggs were hatching. There is no way as yet of learning of the effect this may have had upon the hatching success of these nests, but it undoubtedly would work to their advantage. Of the known causes for nest predation, mammals (coyotes, ground squirrels and skunks) accounted for the largest number, crows and magpies, second and desertion, third. The greatest number were destroyed by causes unknown to the observer and usually took the form of a total disappearance of the eggs, with or without any visible disturbance to the nest. Where several nests of a species were located scaup were by far the most successful (59 percent), with blue-winged teal (50 percent), mallard (37 percent) and canvasback (36 percent) following in that order.

On Area IV, 71 nests were located. It was much more difficult to find nests this year in this area than has previously been the case. This, in spite of the fact that the crew added one more man and two additional young dogs to the regular crew of two men and one dog.

Mallard and canvasback nests comprised the greatest number located and the over-all nest success rose well above last year, 40 percent in 1955, as compared to 28 percent in 1954. The average clutch size declined somewhat from last year (7.2 in 1955 as compared to 8.5 in 1954). Avian predation led in numbers of nests destroyed, (12), while mammalian predation and desertion accounted for the second largest number (eight each). Human interference resulted in the loss of five nests and may have been partially due to attempts to trap hens on nests. Several clutches of canvasbacks were injected with dye in order to study later brood movements, but this seems to have had no ill effects on the hatching of those nests.

Table IV. - Nesting Data, Area III.

Species	No. of Nests	Avg. Clutch	Percent Hatched	Success	Losses					Desert-ion Unknown
					Avian	Mammal	Human	ion	Unknown	
Mallard	40	6.65	15	37.5	3	5	1	3	13	
Pintail	13	7.7	3	23.1		4	2		4	
B-w. Teal	12	6.8	6	50.0	1	2	1		2	
Scaup	37	8.0	19	59.4	5	2		2	4	
Canvasback	14	6.5	5	35.7	2			4	3	
Ruddy	5	6.0	4	100.0						
Shoveler	5	7.6	2	40.0	1				2	
Baldpate	2	9.0	1	50.0		1				
Redhead	2	13.0	1	50.0					1	
G-w. Teal	1	5.0	1	100.0						
Unknown	1								1	
Total	132	7.2	57	45.0*	12	14	4	9	30	

\* Success based on 126 nests, as six were either still incubating at end of study, or were unable to be relocated, (five scaup nests and one ruddy nest).

Table V. - Nesting Data, Area IV.

Species	No. of Nests	Avg. Clutch	Percent Hatched	Success	Losses					Desert-ion Unknown
					Avian	Mammal	Human	ion	Unknown	
Mallard	35	6.9	7	20	8	7	3	4	6	
Pintail	6	8.0	4	66	-	1	-	1	-	
Canvasback	13	8.0	10	77	-	-	-	2	1	
B-w. Teal	2	8.5	1	50	-	-	1	-	-	
G-w. Teal	6	10.2	1	17	3	-	1	-	1	
Ruddy	2	4	-	0	-	-	-	-	2	
Scaup	7	7.7	5	71	1	-	-	1	-	
Total	71	7.2	28	40	12	8	5	8	10	

Production

At least two beat-out brood counts were made on Area II, III and IV during the period from late June to mid-August. No brood counts could be made on Area I because of its droughted condition.

Table VI. - Brood Counts, Area II.

Species	June	July	August	Total Production *
Mallard	0	10	11	14
Pintail	3	12	31	40
Gadwall	0	2	2	4
Baldpate	0	1	3	4
Shoveler	0	0	4	4
Blue-winged Teal	0	18	9	19
Canvasback	0	1	0	1
Scaup	0	7	2	8
Total	3	51	62	84

\* Age classification of broods on each beat-out used to compute total production.

Because of the rapid deterioration of water on this area, observations show that 436 pairs produced 84 broods, or a pair success of only 19 percent. Because of the heavy concentration of broods on large bodies of water surrounding this study area, the above figure cannot be considered an accurate appraisal of production on Area II. There is no doubt but that broods moved away from this area in large numbers as the ponds disappeared.

Table VII. - Brood Counts, Area III.

Species	June	July	August	Total Production
Mallard	8	21	35	44
Pintail	3	4	12	12
Gadwall	-	-	9	9
Baldpate	-	4	4	4
Blue-winged Teal	-	35	74	77
Green-winged Teal	1	10	19	19
Shoveler	-	1	4	4
Redhead	-	-	1	1
Canvasback	-	5	3	5
Scaup	-	-	9	9
Ruddy	-	-	4	4
Unidentified	1	2	-	-
Total	13	82	174	188

The May breeding population of Area III was 438 pairs. According to our brood beat-outs, these birds produced 188 successful broods or a pair success of 43 percent. The average size of Class III broods was 6.1 young per brood, or 1,147 juveniles per 188 broods. This is a total population increase of 131 percent as compared to 74 percent in 1954 resulting from a 25 percent pair success that year. In other words, a 10 percent reduction in breeding population in 1955, resulted in a production nearly double that of a population which was larger by 10 percent in 1954.

Table VIII. - Brood Counts, Area IV.

Species	June	July	August	Total Production
Mallard	10	26 (10)*	49 (5)	58
Pintail	5	11 (3)	8	11
Gadwall	0	1	4	4
Baldpate	0	12 (1)	19 (2)	19
Blue-winged Teal	0	12 (4)	35 (3)	35
Green-winged Teal	1	7 (2)	20 (7)	20
Shoveler	0	2	3 (1)	5
Redhead	0	2	9 (1)	11
Canvasback	8	9	13	15
Scaup	0	0	11	11
Bufflehead	0	1	3	3
Goldeneye	1	1	0	1
Ruddy	0	0	9	9
Unidentified	0	4 (1)	7	7
 Total	25	88 (21)	190 (19)	209

\* Numbers in parentheses represent broody females whose broods could not be counted because of dense cover.

The May breeding population of Area IV was 472 pairs. Brood beat-outs resulted in finding 209 broods or a pair success of 44 percent. The average size of Class III broods was found to be 6.9 young per brood or 1,442 young per 209 broods. This is an increase in over-all population of 147 percent compared to 1954 with a pair success of 28 percent and an over-all increase in population of 73 percent. Again in the case of this portion of the northern parklands, a 10 percent reduction in breeding population, produced twice the young than a larger population had produced the year previously.

Table IX. - Comparison of Ground and Aerial Pair Counts.

Species	Area I			Area II*			Area III			Area IV		
	Ground	Air	% Seen in Air	Ground	Air	% Seen in Air	Ground	Air	% Seen in Air	Ground	Air	% Seen in Air
Mallard	48	39	81.3	62	59	95.2	148	94	63.5	157	111	70.7
Pintail	98	61	62.2	110	85	77.3	20	18	90.0	47	26	55.3
Gadwall	0	0	-	8	3	37.5	9	4	44.4	15	4	26.7
Baldpate	5	1	20.0	27	6	22.2	24	10	41.7	54	15	27.8
Blue-winged Teal	2	3	150.0	21	24	119.0	68	46	67.6	69	51	73.9
Green-winged Teal	1	0	00.0	3	0	00.0	31	4	12.9	24	9	37.5
Shoveler	11	6	54.5	20	21	105.0	1	2	200.0	13	3	23.1
Redhead	0	1	-	0	0	-	15	2	13.3	13	4	30.8
Canvasback	0	0	-	0	3	-	13	7	53.8	25	4	16.0
Scaup	14	1	7.1	34	20	58.8	72	51	70.8	46	10	21.7
Goldeneye	0	0	-	0	0	-	10	0	-	0	0	-
Bufflehead	0	0	-	0	2	-	11	2	18.2	4	0	-
Ruddy duck	0	0	-	3	0	-	9	7	77.7	5	0	-
Ring-necked duck	0	0	-	0	0	-	4	0	-	0	0	-
Cinn. Teal	0	0	-	0	0	-	3	0	-	0	0	-
Unidentified	0	0	-	0	0	-	0	0	-	3	0	-
Total	179	112	62.6	288	223	77.4	438	247	56.4	472	237	50.2

\* Data recorded for that portion of Area II used in 1953-1954. In 1955, area was doubled in size by using both sides of highway.

### Relationship of Aerial to Ground Coverage of Breeding Population

At least two aerial censuses were flown of each study area to ascertain breeding populations during the month of May. Comparative results of the aerial and ground surveys conducted during the population peak are recorded in Table IX.

Aerial observations used in Table IX above, were made under conditions nearly identical to those of 1954. The new emergent growth and edge vegetation on the prairies had not yet begun to appear. In the parklands the same situation existed; and, in addition, the aspen had not begun to leaf. In all cases, the aerial observers increased their percentage of total birds counted this year. On the two prairie study areas, this was particularly noticeable. Observations on Area I were still inferior to those obtained in past years, but water conditions were enough like those of 1954 to account for some of the discrepancies between ground and aerial counts. Many of the mallards and pintails fly on and off the area to a large lake near the study area which makes for a considerable difference in ground-air figures because of the total passage of time between a near-instantaneous aerial count, as opposed to a ground count of several hours.

Table X. - Comparison of Ground and Air Brood Counts.

Area	Ground	Air	Percent Seen by Air	
			First Run	Second Run
I	No broods or water	No broods or water	0	0
II	51 (7/15)	62 (8/1)	42 (7/19)	52 (7/29) 82%
III	82 (7/12)	174 (7/29)	30 (7/12)	121 (7/29) 37%
IV	88 (7/8)	190 (7/29)	56 (7/9)	82 (7/29) 64% 43%

Low water levels and the concentration of broods in the remaining potholes on Area II contributed markedly to the high aerial count of broods in this prairie region. Excellent visibility, plus the early hour and normal movement of broods into open water later in the season resulted in a high percentage of broods being seen on Area III late in July.

Several experimental flights were made during the brood season for the purpose of analyzing such factors as weather, time of day, width of transect, visibility of species by age class, and visibility in different habitat types. This data will be analyzed elsewhere and cannot be included in this report. We have, however, reached the stage where we can try to measure these factors and now have amassed sufficient data to begin an analysis of it. Consistent use of the same aerial observers, attention to time of day, light conditions and wind speeds are proving to be of great value in gathering better brood data from year to year. An analysis of data already gathered should be of great value to all agencies cooperating in these studies and should vastly improve future surveys of the same type.

Summary

1. Water conditions in all study areas were generally above normal at the beginning of this survey in May. A dry summer caused a rapid depletion of ponds throughout Alberta, but seriously affected only Stratum C and portions of the southern edges of Stratum A.

2. The breeding populations on Areas I, II and III were 10 percent below those of 1954, on Area IV they were the same as last year.

3. Nest histories indicate an appreciable increase in nest success this year and a corresponding lessening of nest predation. Populations, lower by 10 percent than in 1954, produced young in numbers nearly double those of 1954.

4. Clutch sizes increased, brood sizes increased and altogether, the production of the study areas (except on Area I) was the best since these studies began in 1952.

5. Aerial observation of breeding populations varied from 77 percent on the prairies to 50 percent in the parklands. Aerial brood counts improved in accuracy in 1955. On prairie Area II, they extended from 82 percent to 84 percent, in parkland Areas III and IV, from 37 percent to 70 percent.

## WATERFOWL BREEDING GROUND SURVEY - SOUTHERN SASKATCHEWAN,

1955

John J. Lynch

1955 proved to be a record year for waterfowl in Southern Saskatchewan. Abundant surface water attracted a fine nesting population this spring, and subsequent favorable weather enabled these breeders to produce a superb crop of ducklings.

For regulatory purposes, we have to appraise at stated intervals the annual waterfowl hatch, long before the "Duck Crop" has actually materialized. Such appraisal is made by means of Province-wide aerial surveys, and by analysis of weather records. This year our earliest "Crop Report" (May 10) is based largely on weather records. Our June 10 "Forecast" (issued for the benefit of Canadian Wildlife Administrators) is based on coverage of 5,000 miles of air transects by U. S. Fish and Wildlife Service Pilot V. C. Conover with Saskatchewan Game Branch Observer William Hyska, Fish and Wildlife Service Pilot Charles Evans with Canadian Wildlife Service Observer Nolan Perret, and Pilot John Lynch with Observer Maurice Lundy, both of the Fish and Wildlife Service. Our July 25 "Forecast" is based on re-coverage of this air transect pattern by Fish and Wildlife Service Pilot Joe Matlock with Observer Hyska, and Fish and Wildlife Service Pilot Don Smith with Observer Perret. Special air operations were conducted by Fish and Wildlife Service Pilots Walter Crissey, Fred Glover, and Robert H. Smith.

Early-Season Prospects

A waterfowl "Crop Report" is a statement of conditions prevailing at a given time, whereas a "Crop Forecast" is a calculated extension of current prospects. Our first appraisal of each season's prospects usually amounts to a "Crop Report", based solely on the weather and surface water conditions at the start of nesting. This year, however, the early season weather and water picture was so favorable that we were moved to forecast, on May 10, "a superlative duck crop for Southern Saskatchewan in 1955."

The prairie region of the Province had a very wet year in 1954. Fall rains were much above normal, especially in the parklands, so that soils were well saturated when winter snows arrived. While these snows were not especially heavy during the past winter, run-off in spring of 1955 was excellent. After April 1, a series of weather disturbances tracked across the Great Plains of the United States. These storms, with their characteristic counter-clockwise circulation, pulled great streams of moist air northward from the Gulf of Mexico. As this moist air over-ran the cool Canadian prairies, periodic rains drenched the waterfowl nesting grounds. By the time we started our May surveys, southern Saskatchewan was as well watered as it has been in recent history.

June 10 Forecast

Once our May air surveys were completed (survey dates May 5 - 22), we had more tangible evidence as to prospects for the 1955 duck crop. These new data were so favorable that our June 10 forecast stated . . ."Look for a duck crop that will probably be as good as that of 1952, with perhaps fewer pintails. . . but with compensatory gains among mallards and other species in the grazing country and the aspen parklands. . . There is an outside chance that the 1955 crop will exceed the 'Big Duck Hatch' of 1952."

These May surveys gave southern Saskatchewan a nesting population index of over five and a half million ducks, a 28 percent increase over the indicated 1954 population. The pintail made the greatest gain, but all the other important species of ducks enjoyed some increase. This increase was most noticeable in the Saskatchewan grasslands, but important gains were registered also in the parklands.

The 1955 water index of over four million ponds was the highest we have recorded in nearly a decade of air surveys in Saskatchewan. This figure was striking evidence of the ample and well distributed rainfall. The entire weather picture continued to be favorable as the season progressed, with no serious cold periods such as interrupted the waterfowl nesting in 1953 and 1954. Periodic rains assured adequate water levels in the potholes and rearing ponds. These rains were so frequent during May that they hampered farming operations, permitting many stubblefield nests to hatch.

Rains were so heavy in eastern Saskatchewan that flooding occurred in some localities. However, this flooding was confined for the most part to stream valleys and glacial drains. Fortunately most of Saskatchewan's waterfowl producing country is located on a plateau above the 1500 foot contour, and floods in stream valleys seldom affect the most productive habitats.

The drake-pair ratio recorded in May suggested that the grasslands nesting effort was proceeding on schedule. In the parklands and the grazing lands, the persistence of paired birds at the end of May probably reflected loss of first nests, since predation always is heavy in these habitats. However the unsuccessful nesters seemed to be going ahead with an immediate and strong second nesting attempt.

July 25 Forecast

Our second coverage (July 5 - 20) of the air-transects showed that weather and surface water continued to be most favorable, and that the bright early season prospects for a successful hatch were becoming a reality. July aerial data produced a forecast index of 266 for 1955, as compared with 240 in 1952 and 185 in 1953. Our July 25 forecast therefore stated that. . ."The 1955 waterfowl rearing season has been the best experienced in southern Saskatchewan in the past five years, even surpassing the outstanding 1952 season."

### Summary of the 1955 Season

The 1955 waterfowl nesting season on southern Saskatchewan was outstanding, largely because of exceptionally favorable weather. At the start of this season, all of the prairie and parkland regions of the Province were in excellent condition, thanks to heavy fall rains in 1954, and good run-off in the spring of 1955. A very substantial nesting population was attracted by super-abundant surface water this spring. Periodic rains during May and June maintained the water supply, and so hampered farming operations that many stubblefield nesting ducks were able to bring off broods from their first nesting attempt.

Weather during the remainder of the nesting and rearing season continued to be most favorable, with rains that were not only ample, but of an unusual type. It might be mentioned here that southern Saskatchewan is almost semi-arid. While summer is considered to be the "rainy season", it is also the season of greatest water loss thru evaporation and transpiration. Summer rains ordinarily consist of sporadic, localized downpours from air-mass thunderstorms, and the dry periods between deluges quickly dissipate surface water, just at the season when waterfowl broods need it the most.

Rains during the summer of 1955 were associated with definite weather systems, rather than isolated thunderstorms, and so were widespread and prolonged. Cloud cover and moist winds kept evaporation to a minimum, and for once, Saskatchewan ended the summer with almost as much water (pond index 3,700,000 in July, 1955) as it had in spring (4,000,000 pond index in May).

There was no important interruption in the 1955 nesting. This was in marked contrast to the past two seasons. In 1953, a cold wave with heavy snow and freezing temperatures occurred in mid-May, just at the peak of early nesting. Again in 1954, a severe cold wave started late in April and persisted thruout the first two weeks in May, greatly delaying the start of nesting.

Heretofore we considered the 1952 season to be the best in recent records for Saskatchewan. That season was outstanding largely because of the overwhelming success of the first nesting of pintails in the grasslands. Production in the parklands was fair to good in 1952, but not exceptional. Late nesting and renesting was only of moderate strength that year, and the water index in July of 1952 was only 850,000, a considerable reduction from the May, 1952 pond figure of 2,300,000.

The 1955 season, on the other hand, featured production that was very good to excellent all over the prairies and parklands of Saskatchewan. A fine early hatch developed in agricultural portions of the grasslands. A good early hatch, plus an exceptional later nesting (and renesting) was indicated for the hilly grazing country in the grasslands. The season's total production in the parklands was unusually heavy, thanks to persistent renesting that compensated for earlier nest predation. All of this was made possible by a most fortuitous sequence of weather patterns. Insofar as weather was concerned, 1955 was "the perfect year" for waterfowl in southern Saskatchewan.

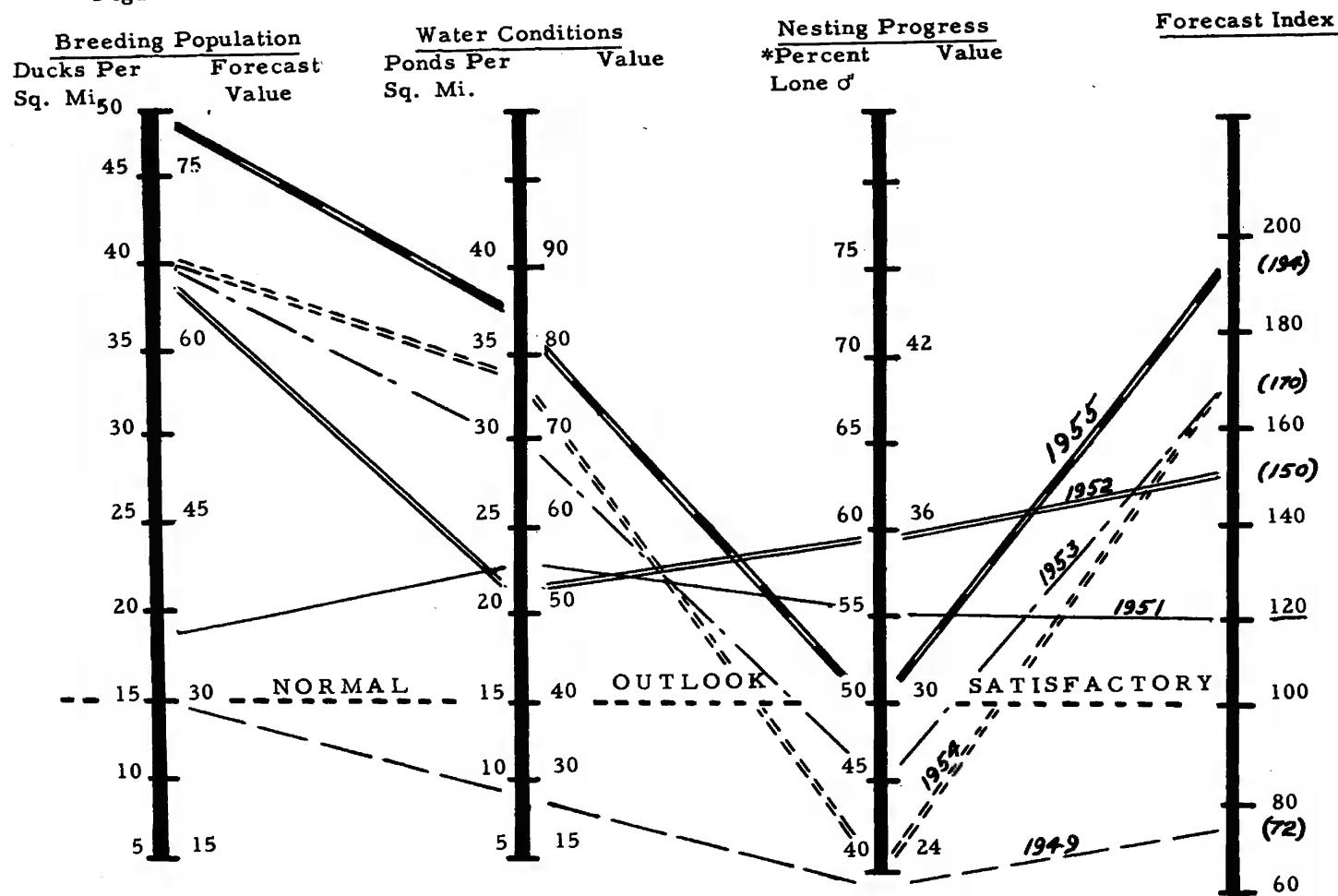
Table I. - Species Indices (Aerial) - May, 1955 Waterfowl Population - Southern Saskatchewan.

Species	S T R A T A				Provincial Total
	A-East (S.E. Parklands)	A-West (Grasslands)	B (Parklands N & W)	C (Shortgrass)	
Pintail	140,800	827,900	581,600	211,600	1,761,900
Mallard	342,200	673,700	867,800	135,900	2,019,600
Baldpate	27,500	76,000	111,700	18,900	234,100
Shoveler	38,000	145,700	134,900	33,200	351,800
Gadwall	6,500	61,200	30,200	11,100	109,000
Blue-winged Teal	97,100	111,900	139,600	18,000	366,600
Green-winged Teal	4,900	14,800	30,200	2,800	52,700
Black Duck	Tr.				Tr.
Surface Ducks	657,000	1,911,200	1,896,000	431,500	4,895,700
Scaup	109,200	126,700	197,800	23,000	456,700
Canvasback	24,300	31,700	121,000	1,800	178,800
Redhead	9,700	21,100	51,200	2,300	81,300
Ringneck	1,600	8,400	9,300		19,300
Ruddy Duck	5,700	12,700	25,600	2,300	46,300
Goldeneye	800	Tr.	4,700		5,500
Bufflehead	800		9,300		10,100
Scoter			11,600		11,600
Merganser	Tr.				Tr.
Diving Ducks	152,100	200,600	430,500	29,400	812,600
Total Ducks	809,100	2,111,800	2,326,500	460,900	5,708,300
Coots	35,800	36,900	104,600	7,400	184,700
Ponds	1,335,400	914,400	1,705,000	204,600	4,159,400

From May operational air surveys, corrected for lone females (unseen hens).

Pond figures do not include puddles in plowed land.

Figure 1. - 1955 Waterfowl Crop Outlook, Southern Saskatchewan (as of June 10, 1955).



\* Indicates Percent of birds seen that were lone drakes. This to be changed later to  
"Drake-Pair Ratio".

Figure 2. - Waterfowl Crop Forecast for Southern Saskatchewan (as of July 25, 1955).

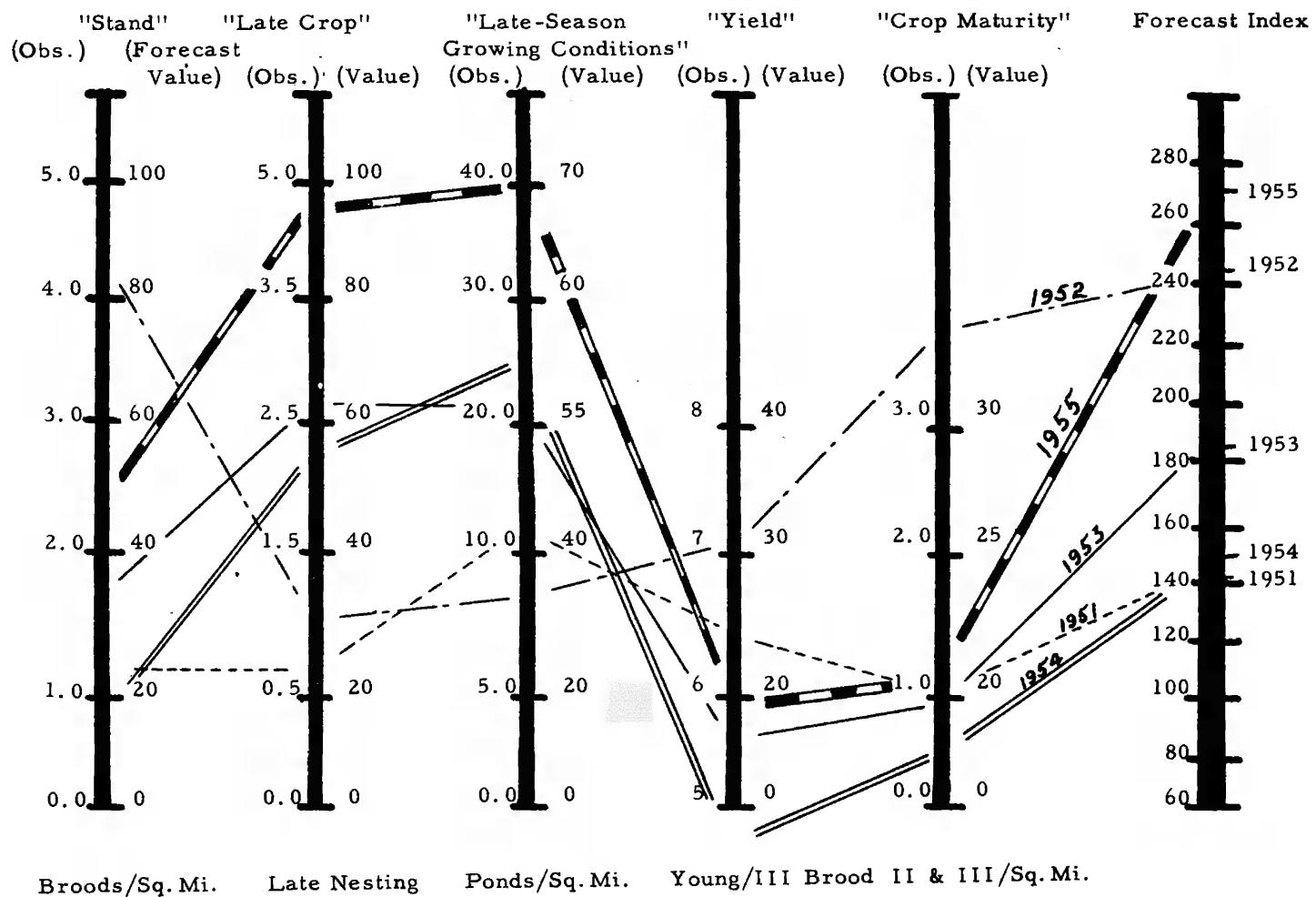


Table II. - Comparative Breeding Population Indices (May aerial), Southern Saskatchewan.

Species	AVERAGE		1954 INDEX	1955 INDEX
	INDEX 1949-1953	1953 INDEX		
Pintail	923,925	1,335,000	1,254,100	1,761,900
Mallard	1,186,400	1,958,300	1,915,200	2,019,600
Baldpate	183,075	184,800	178,500	234,100
Shoveler	200,650	255,100	267,700	351,800
Gadwall	79,075	76,900	84,600	109,000
Blue-winged Teal	161,750	133,400	256,900	366,600
Green-winged Teal	22,400	21,200	19,500	52,700
Total Surface Ducks	2,757,275	3,964,700	3,976,500	4,895,700
Scaup	146,250	208,800	215,500	456,700
Canvasback	123,150	253,200	150,400	178,800
Redhead	38,300	84,800	67,200	84,300
Ringneck	8,650	400	5,500	19,300
Ruddy Duck	21,475	17,500	13,500	46,300
Goldeneye	8,700	600	7,900	5,500
Bufflehead	10,725	8,700	4,100	10,100
Scoter	45,975	47,100	98,600	11,600
Total Diving Ducks	403,225	621,100	562,700	812,600
Total Ducks	3,160,500	4,585,800	4,539,200	5,708,300
Coots	87,500	151,700	130,000	184,700

Table III. - Yearly Comparison by Strata - Spring Conditions, Waterfowl Nesting Grounds of  
Southern Saskatchewan (From Air Surveys).

Strata	May, 1952		May, 1953		May, 1954		May, 1955	
	Ducks	Ponds	Ducks	Ponds	Ducks	Ponds	Ducks	Ponds
A-East	402, 700		415, 700		709, 600		809, 100	
(SE Parkland)		296, 400		508, 100		864, 300		1, 335, 400
A-West	1, 830, 700		1, 774, 300		1, 388, 500		2, 111, 800	
(Grassland)		726, 300		974, 600		669, 800		914, 400
B-(N & W Parklands)	1, 815, 500		1, 742, 900		1, 970, 200		2, 326, 500	
		1, 156, 900		2, 041, 000		2, 233, 000		1, 705, 000
C - (Shortgrass)	381, 400		652, 500		470, 800		460, 900	
		126, 400		203, 200		188, 500		204, 600
Provincial	4, 430, 300		4, 585, 700		4, 539, 200		5, 708, 300	
Totals		2, 306, 000		3, 727, 000		3, 955, 600		4, 159, 400

Table IV. - May, 1955 Air Survey Data - Southern Saskatchewan, (May 5 Thru 22, Conover and Hyska,  
Evans and Perret, Lynch and Lundy) - (Estimated Air Hours - 95).

Strata	Area in Sq. Mi.	Sample in Sq. Mi.	Ducks Act. Seen	Percent Males	Ind. Dx. Seen	Ducks/ Sq. Mi. S*	Ind. Pop. Sq. Mi.	Coots/ Sq. Mi. Pop.	Ind. Coot Pop.	Pond/ Sq. Mi.	Ind. Ponds
A-East	14,600	317.0	2,332 ♂ 1,117 prs. 753 flocks 6,542 unident.	44.9	17,561	55.4	809,100	2.4	35,000	91.5	1,335,400
A-West	36,630	625.0	6,780 ♂ 3,135 prs. 10,037 unident.	51.9	35,076	56.1	2,111,800	0.98	36,900	24.3	914,400
B	50,520	324.0	2,705 ♂ 1,439 prs. 4,468 unsex.	48.5	14,923	46.0	2,326,500	2.07	104,600	33.7	1,705,000
C	11,290	127.0	1,078 ♂ 534 prs. 1,306 unident.	50.2	5,185	40.82	460,900	0.65	7,400	18.1	204,600
Provincial Totals	114,040	1393.0			50.05	5,708,300	1.6	183,900	36.4	4,159,400	

\* Stratum Population

Table V. - Approximate Species Composition - July, 1955 - Brood and Late Nesting Indices (From Air Data).

Species	"A" - East		"A" - West		"B"		"C"		Provincial Totals	
	Broods	Late Nesting Index	Broods	Late Nesting Index	Broods	Late Nesting Index	Broods	Late Nesting Index	Broods	Late Nesting Index
Pintail	4,500	6,500	25,230	21,750	68,325	22,620	7,150	1,710	105,205	52,580
Mallard	14,300	32,000	36,260	94,020	67,805	39,585	8,790	25,650	127,155	191,255
Baldpate	400	4,100	2,925	13,590	2,790	1,450		1,710	6,115	20,850
Shoveler	400	2,200	7,185	9,740	16,560	8,410	1,230	2,850	25,375	23,200
Gadwall	200	2,200	2,340	17,220		2,755		5,700	2,540	27,875
B-w. Teal	2,000	9,100	6,270	26,280	8,365	27,695	1,640	10,260	18,275	73,335
G-w. Teal		300		4,755		2,175		1,140		8,370
Scaup	600	2,200	1,000	23,335	2,090	12,035	410	6,840	4,100	44,410
Canvasback	1,500	900	2,340	6,570	5,575	6,380	1,230	570	10,645	14,420
Redhead	200	1,400		3,850		4,205			200	8,455
Ringneck	200	1,400				2,175			200	3,575
Ruddy		5,300		5,440	2,790	8,410		570	2,790	19,720
Misc.						7,105				7,105
Total Broods	24,300		83,550		174,300		20,450		302,600	
Late Nesting Index		67,600		226,550		145,000		57,000		496,150
Coots	4,400	30,700	1,130	33,500	14,145	47,000		45,200	19,675	156,400
Ponds		1,469,200		875,300		1,156,900		229,700		3,731,100

Table VI.--Comparison by Species - July Brood and "Later Brood" Indices - 1952 - 1954 (From July Air Surveys).

Species	July, 1952		July, 1953		July, 1954	
	Broods	Late Nesting Index	Broods	Late Nesting Index	Broods	Late Nesting Index
Pintail	272,160	13,510	36,250	32,870	19,200	10,980
Mallard	155,510	44,030	92,130	107,890	49,710	81,420
Baldpate	10,520	18,000	8,850	21,080	2,150	17,260
Shoveler	32,380	11,670	18,550	13,390	10,750	5,360
Gadwall	7,580	12,450	8,120	14,840	1,830	13,490
B-w. Teal	17,500	18,470	7,890	35,380	10,710	23,620
G-w. Teal	800	1,860	0	3,460	0	4,770
Scaup	1,530	8,700	3,870	28,450	370	12,590
Canvasback	6,840	830	7,220	15,660	2,690	3,240
Redhead	420	3,220	0	7,970	0	4,500
Ringneck	420	0	0	2,990	0	5,170
Ruddy	3,150	7,130	750	14,020	870	16,670
Goldeneye	0	920	0	0	0	1,980
Scoter	390	0	0	2,540	0	1,320
Bufflehead	0	0	0	450	0	0
Total Broods	509,200		183,630		98,280	
Total Late Nesting Index		140,790		300,990		202,370
Coot	28,770	84,230	8,380	53,480	4,330	62,830
Ponds		855,070		2,551,420		2,818,090

## WATERFOWL BREEDING GROUND SURVEY - SUCCESS STUDY

AREA - SASKATCHEWAN, 1955

Henry Reeves, Maurice Lundy and Fred Kreller

Introduction

The Success Study Area in the shortgrass prairie of southwestern Saskatchewan was established this year for the following purposes:

1. To obtain breeding pair, brood, and water area data for comparison with those obtained by aerial crews working the identical area.
2. To obtain information on habitat requirements of breeding birds, and the effects of water, climatic conditions, and habitat on production and survival of young.

The study was initiated on May 4 by U. S. Game Management Agents Henry Reeves and Maurice Lundy of the Fish and Wildlife Service. Agent Lundy was relieved by Agent Fred Kreller during the latter half of the study until August 11 when field work was concluded.

The Study Area

Located 12 miles north of Swift Current and just south of the South Saskatchewan River, the area extends outwards one-eighth of a mile on each side of four roads intersecting to form a rectangle (Figure 1). Saskatchewan Highways 4 and 32 form the east and south sides of the rectangle, while secondary roads form the north and west sides. The towns of Stewart Valley and Success are located on the northeast and southwest corners.

Distance around the area to point of beginning is 46 miles. A total of 7,147 acres, or 11.17 square miles, composed of 69 percent agricultural lands, 24 percent grasslands, and 7 percent water areas, is included. Most of the agricultural land is devoted to small grain production, while the native grasslands is usually grazed moderately.

The locale is situated at an elevation of about 2,500 feet in the Missouri Coteau. Major topography is largely of ice age derivation and much is of knob and kettle formation, although ground moraines and glacial lake remains may be found locally. Soils are typically brown and their textures range from clay to fine sandy loam with loam predominating. Soils of the few large poorly drained basins are heavily alkaline.

The area typically has long severe winters and short mild summers. Length of growing season averages 125 days although seasons as short as 103 days have been recorded. Mean January temperature is 7.6° F. while the summer high mean of 66.0° F. occurs in July. Precipitation averages only 13.89 inches annually; however, since 1950, yearly moisture has been well above normal. Last year was relatively wet with 19.71 inches being recorded. Greatest monthly precipitation usually occurs in July, with 2.92 inches being the long-time average.

Native vegetation is typical of the shortgrass prairie and is dominated by such drought resistant species as blue grama-grass (Bouteloua gracilis), spear-grass (Stipa comata), June grass (Koeleria cristata), sagebush (Artemisia spp.), and cacti (Opuntia spp.). Brushy species such as snowberry (Symphoricarpos spp.), rose (Rosa spp.), and wolf willow (Elaeagnus commutata) provide important nesting cover along sidehills and ravines. Important emergent aquatics include sedges (Carex spp.), smartweeds (Polygonum spp.), cattail (Typha latifolia), spike-rushes (Eleocharis spp.), manna-grasses (Glyceria spp.), and bulrushes (Scirpus spp.). Common submergents are bladderworts (Utricularia spp.), pond-weeds (Potamogeton spp.), coontail (Ceratophyllum demersum), and milfoils (Myriophyllum spp.). Water areas are usually choked with sedge, smartweed, and grasses by early July. Shortgrass prairie water areas are usually free of a surrounding fringe of aspens and willows, the characteristic of parkland water areas.

Possible waterfowl predators on the area include crows, magpies, hawks, badgers, and skunks, with the latter being abundant everywhere. Crows are common although not found in large numbers. Magpies are uncommon.

### Weather and Water Areas

#### Findings

This spring, returning waterfowl found the Success Study Area in excellent condition. Well above average rains, especially in March, April, May and July, coupled with a good retention of water from the previous year gave assurance of abundant waterfowl habitat. Precipitation during the first seven months of 1955 was 42 percent above normal (Table 1).

Water areas were classified according to degree of permanence by Bach's system.<sup>1</sup> Of all the potholes, 27 (8.0 percent) were of Class B category, 105 (30.9 percent) were of Class C, and 208 (61.1 percent) were of Class D designation (Table II.). Class D areas averaged only 0.3 acres in size as compared

<sup>1</sup> Class B areas: Water areas which normally hold water the year round.

Class C areas: Water areas which normally dry up during July and August.

Class D areas: Water areas which hold water for only a few days or weeks after spring run-off and after flash floods.

with the 8.2 acres average size for Class B areas. Water conditions were satisfactory until late June when normal drying up of areas reduced the total number to 171 (Figure 2). However, a deluge in early July reflooded all areas, thus insuring an adequacy for late broods.

Water gauges were installed in 33 ponds selected by their degree of permanence and location within the area. These were read approximately twice monthly and changes in water levels plotted (Figure 3). Generally, the more permanent ponds exhibited lesser fluctuations than the more transient water areas.

#### The Breeding Population

All species of waterfowl nesting on the area were present upon our arrival. Four breeding pair counts were completed on the area between May 6 and June 6. Notes of grouped ducks, such as two or more males together, or unpaired males and females together in a flock, were kept but these were not included in the calculations for the breeding population. Since breeding and nesting activities of the various species are not synchronized, we did not feel that any one census could be utilized in determining the breeding population for all species present. Thus, we selected the count that we felt was best representative of the breeding population for each species. This selection was based upon observations of migration and nesting progress, and upon noted tendencies of ducks to gather on certain water areas. The corrected breeding pair count totalled 861 pairs, or an average of 76.9 per square mile (Table III.). The pintail made up 30.8 percent of the total population and was closely followed by the mallard representing 27.2 percent. The only other two important species numerically, the blue-winged teal and shoveler, together totalled 27.3 percent of the population.

#### Nesting

This year will be remembered for its unusually early, wet nesting season. Eggs found in active incubated nests were back-dated by the Gollop method to determine approximate date of laying. By applying an assumed figure of one day per egg of the clutch, the approximate date of nest initiation was determined. The earliest pintail nest so calculated was April 21, and for mallard, April 19. First nesting attempts, as determined by amount of down present in the incubated nests, peaked during the week of April 24-30 for pintails, and the week of May 1-7 for mallards.

Only nests active when found were used in determining percent hatching success. Of these 153 nests of nine species, 72 or 47.4 percent produced ducklings. An even 50 percent of the 50 pintail nests hatched successfully, while 48.8 percent of 80 mallard nests were successful. Since these figures include data from all nesting attempts, nests were then reclassified as being either first attempts or renesting attempts, according to the amount of down present in the incubated nest. These corrected data indicate a 64.9 percent hatch for pintail first attempts and a 61.8 percent hatch for mallard first attempts. Biggest cause of nest

failure was skunk predation which accounted for 42, or 27.5 percent of the 153 nests; crow predation destroyed 26 nests, or 17.0 percent of the total (Table IV.).

It must be mentioned that most of our nest search was confined to brushy patches of snowberry and rose, and thus, the various cover types were not examined in proportion to their acreage on the study area. Stubble fields, known to provide cover for many pintails were almost untouched. However, farming operations were at least two weeks behind schedule this spring, and it appears that stubble nesters were unusually successful in producing broods.

### Hatching

Broods were aged and back-dated to approximate date of hatch by use of the method developed by Gollop and Marshall. These approximate hatching dates were grouped by weekly intervals, and the curves for total waterfowl, pintail, mallard, blue-winged teal, and shoveler plotted (Figure 4). The earliest hatchings, those of pintails and mallards, were during the week of May 15-21. The pintail hatching curve rose to an abrupt peak during May 29-June 4, and then quickly declined. Subsequent hatchings continued in small numbers until July 17-23 when the last broods appeared. Analysis of the pintail curve suggests a very good first hatch. Mallard hatchings attained two peaks, one between May 22-28, and the other about three weeks later between June 12-18; this curve suggests a rather weak first hatch followed by a fair subsequent attempt. The blue-winged teal curve indicated a good first hatch while only a fair hatch is indicated for first shoveler attempts.

### Broods

Three complete brood counts were undertaken between June 4 and August 10 on the study area (Table V.). In order to reduce duplication to a minimum, the surveys were spaced about one month apart. Only the first census on June 4-6 was made with the aid of a dog; the other two were "beat-outs". Broods were assumed to be present for "broody", or feigning hens. All broods noted for the three counts were totalled and corrected for suspected duplications and potential later broods. Thus, total brood production on the Success Study Area was calculated at 226, or 23.8 per square mile. Comparison of the percent composition of broods with that of the breeding population suggests that pintails, blue-winged teals, and shovelers experienced a better hatch than the average for all species combined, while mallards had slightly below average hatch.

Complete counts were obtained for 345 broods of 11 species; these are summarized in Table VI. by the age group classification devised by Gollop. Because of the small number of known complete Class III broods observed, we supplemented these with Class IIc data to obtain sufficient information for broods attaining, or nearly attaining flight size. Broods for all species combined decreased from an average of 7.41 young for Class Ia to 6.48 for Classes IIc and III combined. This is a loss of only .93 young per brood, or 12.5 percent mortality, from the Ia figure.

Further analysis of pintail and mallard duckling mortality by comparing average hatch per successful nest with average combined Classes IIc and III brood size indicated mortalities of 39.3 and 24.4 percent respectively (Table VII.). It appears that although the pintail is the more successful nester, it is less successful than the mallard in rearing young to the flying stage. These figures suggest that the most perilous period for ducklings is the first day or so after hatchings.

#### Production

Estimated production of ducklings attaining flight was made by applying the corrected brood production figure of 266 to the average brood size of 6.48 for all species. This resulted in a total of 1.724 flying young, or 154.3 per square mile.

However, we consider these to be minimum production figures since it was felt that a sizeable but unknown number of broods were missed during the second and third beat-out counts when all water areas were choked with dense stands of emergent aquatics. The likelihood of flushing broods out of the water area and overland when we entered the pothole from the distant end must also be considered. To further illustrate, a comparison of the first nesting attempt success was made with the percent of females accompanied by young (Table VIII.). Although our nesting studies indicated a high 64.9 percent successful hatch for pintail first attempts, the brood surveys indicated that only 32.5 percent of the females were with broods. The mallard exhibited a 61.8 percent successful first nesting attempt as compared to 29.5 percent of the breeding females being with broods. It is unknown how much of these discrepancies are due to unrepresentative sampling of nesting habitat, or to our failure to locate all broods. Each of these phases must be further investigated.

#### Banding

A total of 513 ducks of eight species were banded on the Success Study Area during the summer (Table IX.).

Table I. - Monthly Precipitation During 1955 as Compared to the 1922-1954 Average.

Year	Precipitation in Inches *								Total to Aug.
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	
1922-1954	0.71	0.52	0.65	0.84	1.62	2.92	1.90	1.79	9.16
1955	0.82	0.41	1.29	2.15	2.65	1.67	4.06	-	13.05
% Difference	+15	-21	+98	+151	+64	-43	+114	-	+42

\* From records of Dominion Experimental Farm, Swift Current, Saskatchewan.

Table II. - Classification and Size of Water Areas on the Success Study Area.

Water Area Classification	Number of Areas	Percent of Total	Average Size in Acres	Percent of Total Acreage
Class B.	27	8.0	8.2	48.6
Class C.	105	30.9	1.7	39.8
Class D.	208	61.1	0.3	11.6
Total	340	100.0	1.3	100.0

Table III. - Breeding Pair Census, Success Study Area, 1955 \*.

Species	May 6-7	May 11-12	May 24-25	June 4-6	Corrected Brd. Prs.	Percent Sp. Comp.	Pairs/ Sq. Mi.
Pintail	304	265	222	143	265	30.8	23.7
Mallard	214	234	179	139	234	27.2	20.9
B-w. Teal	66	103	144	142	144	16.7	12.7
Shoveler	57	65	91	72	91	10.6	8.1
Baldpate	37	36	40	40	40	4.6	3.6
Gadwall	17	32	38	37	37	4.3	3.3
Lesser Scaup	37	19	22	23	23	2.7	2.1
Canvasback	16	11	14	7	11	1.2	1.0
Redhead	9	10	21	7	10	1.1	0.9
G-w. Teal	10	6	4	2	4	0.5	0.4
Ruddy duck	2	-	2	-	2	0.3	0.2
Total	769	781	777	612	861	100.0	76.9

\* Breeding pairs equals lone drakes plus pairs. Underscored figures are those selected for corrected breeding pairs.

Table VII. - Duckling Mortality for Pintail, Mallard, Blue-winged Teal, and Shoveler on the Success Study Area, 1955.

Species	Avg. Hatch/ Successful Nest	Avg. Class	Avg. Class	% Mort. Hatch	% Mort. Class
		Ia Brood Size	IIc & III Brd. Size	to Class IIc & III Brd. Size	Ia to IIc & III Brd. Size
Pintail	8.32	6.69	5.05	39.3	24.5
Mallard	8.63	7.55	6.50	24.4	13.9
B-w. Teal	-	10.25	7.69	-	24.9
Shoveler	-	9.33	7.56	-	18.9

Table VIII. - Percent of Females Producing Broods on the Success Study Area, 1955.

Species	Corrected Breeding Pair Census	Corrected No. of Broods Produced	Percent of Females Producing Broods
Pintail	265	86	32.5
Mallard	234	69	29.5
Blue-winged Teal	144	49	34.0
Shoveler	91	31	34.1
Baldpate	40	9	22.5
Gadwall	37	5	13.5
Lesser Scaup	23	8	34.8
Canvasback	11	5	45.5
Redhead	10	1	10.0
Green-winged Teal	4	1	25.0
Ruddy duck	2	2	100.0
Total	861	266	30.9

Table IV. - Summary of Active Nests Concluded on the Success Study Area - 1955.

Species	No. of Active Nests Concluded	Nests Hatched		Destroyed by Predation			Destroyed		
		No.	%	Skunk	Crow	Unknown	by Agri.	Abandoned	Misc.
Mallard	80	39	48.8	25	10	1	1	3	1
Pintail	50	25	50.0	15	7	3	-	-	-
Canvasback	11	4	36.3	1	3	3	-	-	-
B-w. Teal	4	1	25.0	-	3	-	-	-	-
Redhead	3	1	33.3	-	2	-	-	-	-
Gadwall	2	1	50.0	1	-	-	-	-	-
Shoveler	1	-	00.0	-	-	1	-	-	-
Baldpate	1	1	100.0	-	-	-	-	-	-
Lesser Scaup	1	-	00.0	-	1	-	-	-	-
Total	153	72	47.4	42	26	8	1	3	1

Table VI. - Broods Censused on the Success Study Area, 1955.

Species	June 4-6			July 9-14			Aug. 6-10			Uncorrected	Corrected	Percent
	Brds.	Brdy h.	Total	Brds.	Brdy h.	Total	Brds.	Brdy h.	Total	Total	Total	Comp.
Pintail	32	-	32	23	20	43	3	9	12	87	86	32.3
Mallard	14	-	14	19	15	34	9	12	21	69	69	25.9
B-w. Teal	-	-	-	13	14	27	8	12	20	47	49	18.4
Shoveler	-	-	-	8	13	21	7	2	9	30	31	11.7
Baldpate	-	-	-	3	1	4	2	2	4	8	9	3.4
Lesser Scaup	-	-	-	1	-	1	4	-	4	5	8	3.0
Gadwall	-	-	-	-	-	-	4	1	5	5	5	1.9
Canvasback	-	-	-	-	2	2	2	1	3	5	5	1.9
Ruddy duck	-	-	-	-	-	-	2	-	2	2	1	0.7
Redhead	-	-	-	1	-	1	-	-	-	1	1	0.4
G-w. Teal	-	-	-	-	-	-	-	1	1	1	1	0.4
Total	46	-	46	68	65	133	41	40	81	260	266	100.0

Table VI. - Average Brood Sizes by Age Classes on the Success Study Area, 1955.

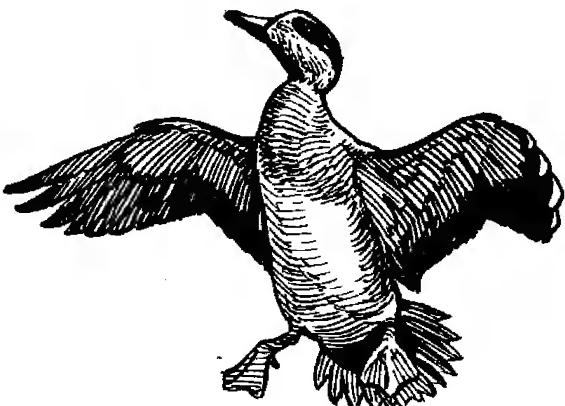
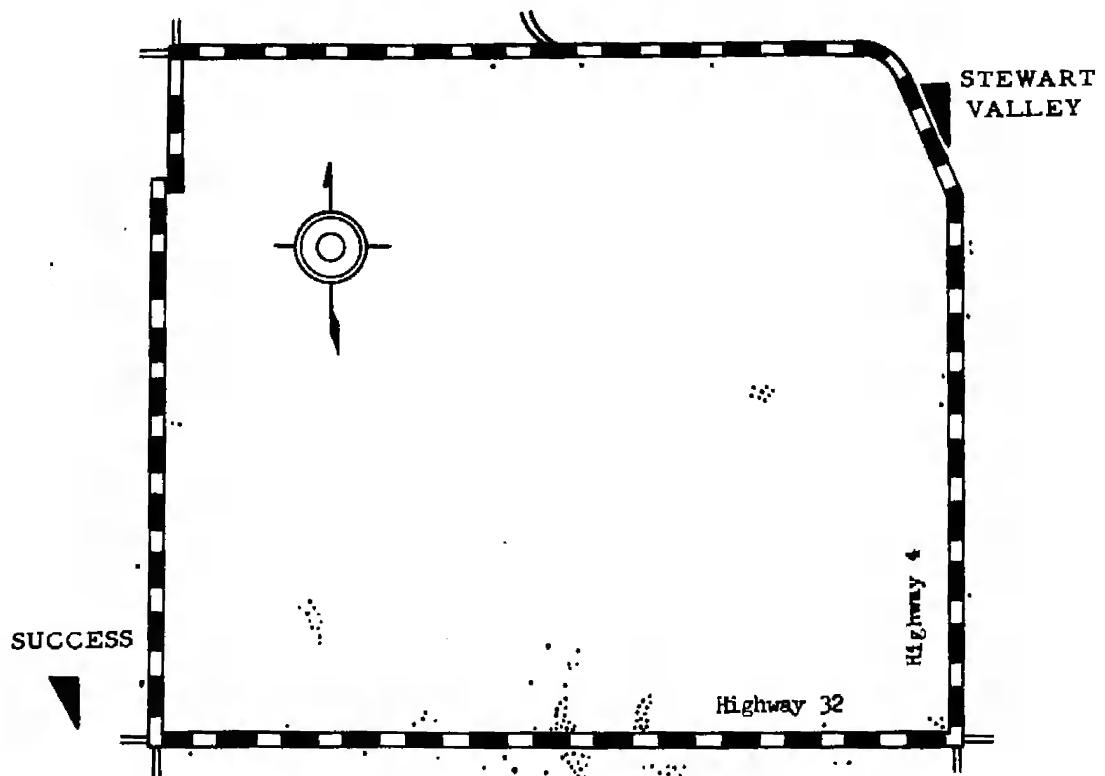
Species	Average Brood Size *								All Age Classes	No. of Broods
	Ia	Ib	Ic	IIa	IIb	IIc	III	IIc and III		
Pintail	6.69	6.25	6.28	5.27	5.55	5.00	5.09	5.05	6.11	116
Mallard	7.55	6.92	7.28	5.40	8.31	6.50	6.50	6.50	6.96	95
B-w. Teal	10.25	8.00	8.17	8.50	7.69	7.69	-	7.69	8.10	52
Shoveler	9.33	9.00	7.00	6.71	9.14	8.33	6.00	7.56	8.13	40
Gadwall	9.50	7.00	7.75	8.00	9.00	5.00	-	5.00	8.31	16
Baldpate	6.00	7.00	6.00	7.00	7.00	-	-	-	6.78	9
Canvasback	7.50	7.00	8.00	-	-	5.00	-	5.00	7.14	7
L. Scaup	8.00	4.00	-	4.00	-	-	-	-	6.40	5
Redhead	-	6.00	-	-	5.00	-	-	-	5.50	2
Ruddy duck	9.00	-	-	-	-	-	-	-	9.00	2
G-w. Teal	-	-	-	-	-	11.00	-	11.00	11.00	1
Total	7.41	7.09	7.25	6.33	7.39	6.88	5.73	6.48	7.05	345

\* Only complete broods included.

Table IX. - Summary of Ducks Banded On and Near the Success Study Area, 1955.

Species	Local				Immature			Adult			Total	Total	Un-	Grand
	Male	Female	sexed	Tot.	Male	Female	Tot.	Male	Female	Tot.				
Pintail	15	25	1	41	77	139	216	7	7	14	99	171	1	271
B-w. Teal	63	51	-	114	-	1	1	15	2	17	78	54	-	132
Mallard	11	9	-	20	23	9	32	26	4	30	60	22	-	82
Shoveler	5	8	-	13	-	-	-	-	-	-	5	8	-	13
Baldpate	3	5	-	8	-	-	-	-	-	-	3	5	-	8
G-w. Teal	1	2	-	3	-	-	-	1	-	1	2	2	-	4
Gadwall	1	1	-	2	-	-	-	-	-	-	1	1	-	2
L. Scaup	-	-	-	-	-	-	-	-	-	-	1	-	-	1
Total	99	101	1	201	100	149	249	49	14	63	248	264	1	513

Figure 1. The Success Study Area, Saskatchewan.



Active nests •

0 1 2 3 4 5  
Scale in miles



SASKATCHEWAN



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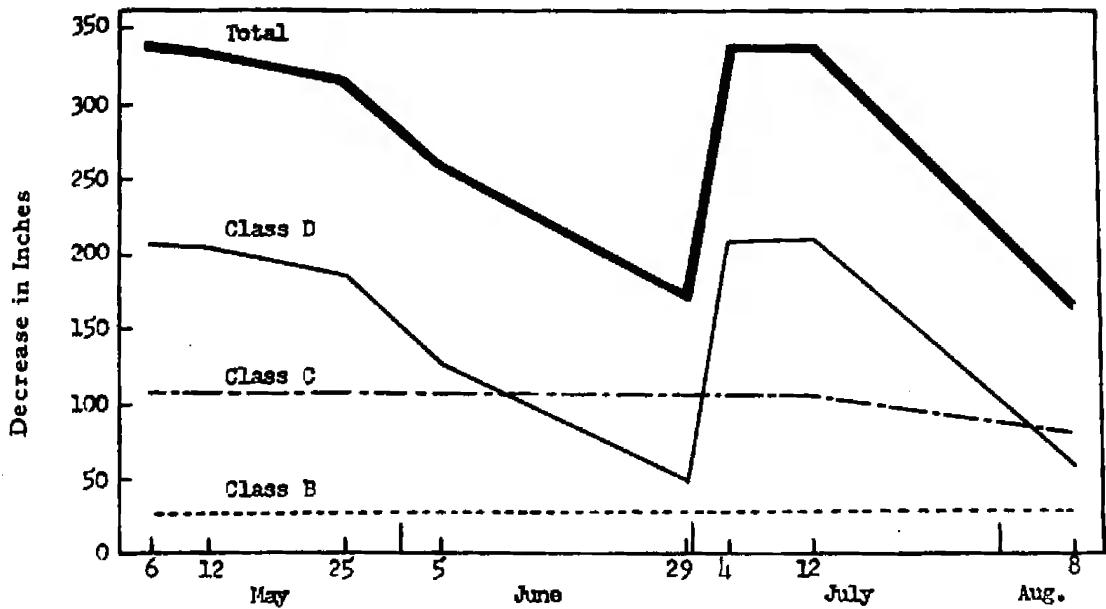


Figure 2. Number of Water Areas on the Success Study Area, 1955.

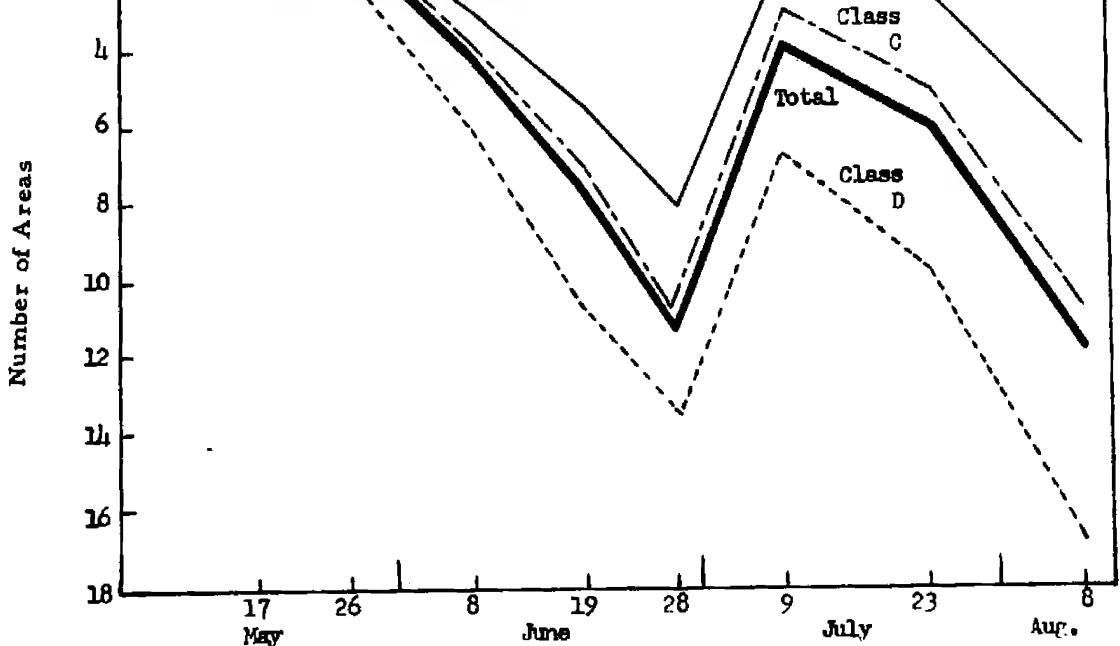


Figure 3. Waterlevel Fluctuations on the Success Study Area, 1955.

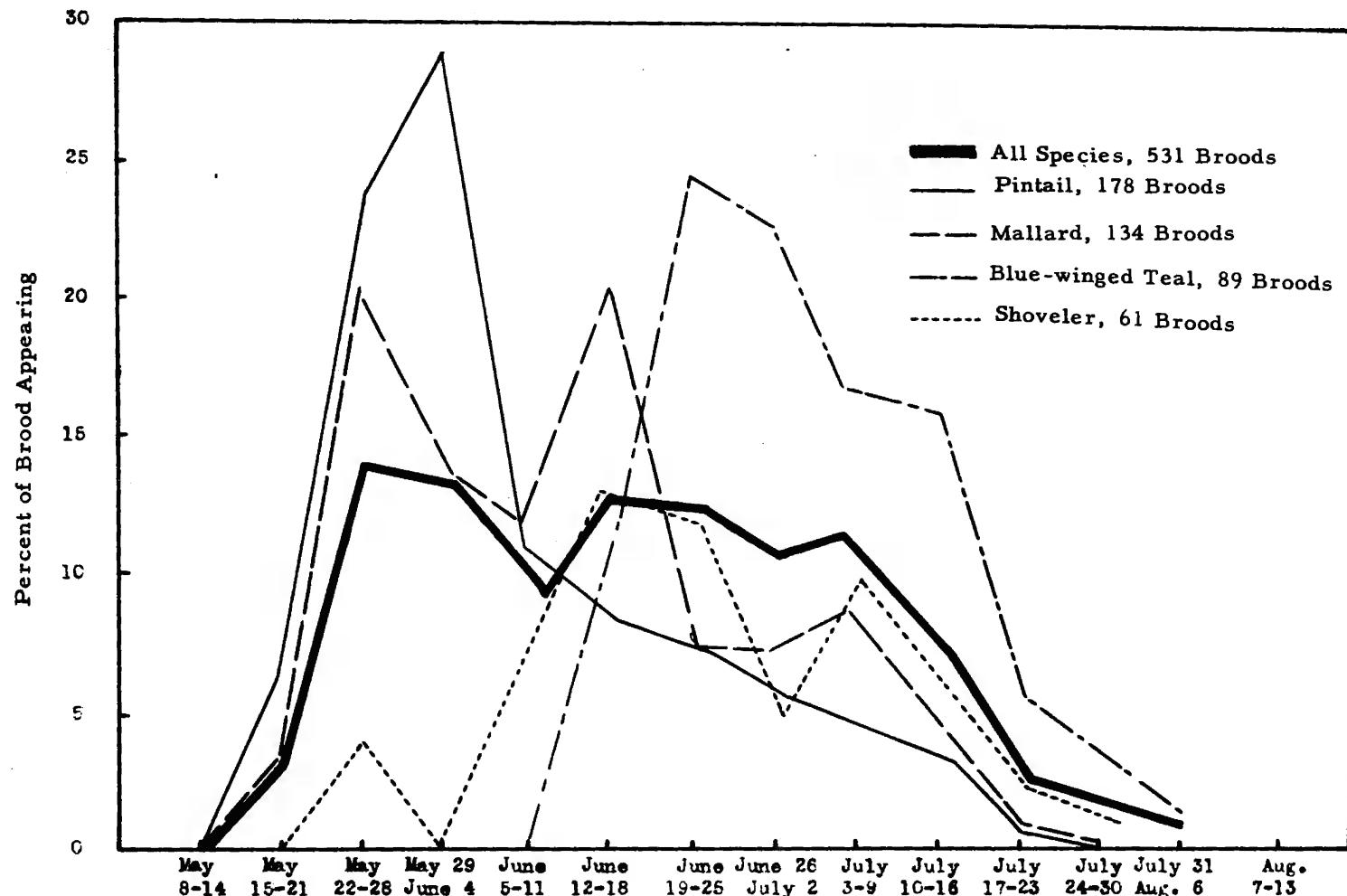


Figure 4. Hatching Peaks for Mallard, Pintails, Blue-winged Teal, Shoveler, and All Species Combined on the Success Study Area, 1955.

WATERFOWL BREEDING GROUND SURVEY OF REDVERS AREA,  
SASKATCHEWAN, 1952-1955

Jerome H. Stoudt and Bruce A. Yeager

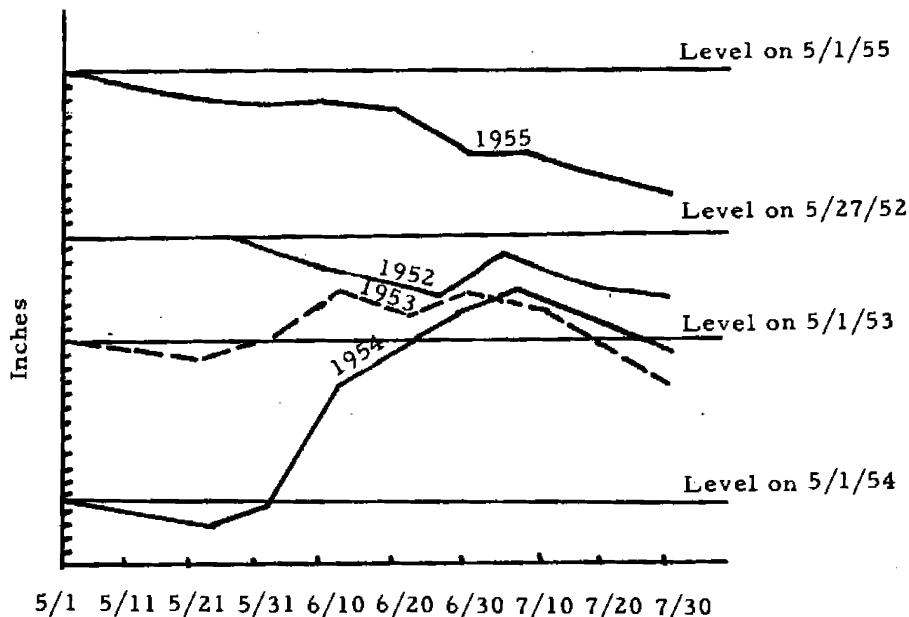
Introduction

The Redvers Study Area was established in 1952 in the aspen-parklands habitat type of southwestern Saskatchewan in order to study waterfowl population dynamics, habitat preference and the effects of water, climate and predators upon the production and survival of young. The population data obtained was also to be used as a standard with which to determine percentages of breeding pairs and broods which were missed by aerial crews in this habitat type. Following is a brief summary of findings during the three-year period from 1952-1955.

Weather and Water Conditions

From the graph which appears below can be noted that water levels on May 1, 1955 were 33 inches higher than on May 1, 1954 and that 1955 water levels never did recede as far as the maximum levels reached during 1952-1954.

Four Years of Water Level Fluctuations, 1952-1955  
Redvers Area, Saskatchewan



Heavy rains on May 2 and 3 added to previously abundant rainfall brought May water levels up to a point which set a new record for the area according to some observers.

Normal precipitation for the period April through July is 7.37 inches for the Redvers Area. In 1952 we received 7.18 inches; in 1953, 10.4 inches in 1954, 10.5 inches and in 1955 12.1 inches. Although more rain fell during the 1955 breeding season most of it came before over the water nesting began and came in the form of steady periodic rains rather than as severe storms which cause flash floods and quick rising water levels as in 1954. Considerable emergent vegetation left over from the 1954 season was flooded during May 1955 but there was enough left for canvasback as eventual high nesting success for this species showed.

The weather was generally cool and wet throughout the entire four month period with a few hot days in July but not hot and dry enough for any length of time to cause an appreciable lowering of water levels. While generally cool and wet, temperature extremes were not great and did not affect a normal production of predator food. Very little burning was accomplished by farmers either during the wet fall of 1954 or the wet spring of 1955 so that nesting cover was in excellent shape especially by June.

#### Water Areas

The number and percent of water areas occurring during the four coverages during the four-year period are as follows:

Table I. - Water Area Data - 1952-1955.

Number of Areas Containing Water on Each Coverage \*

	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>
Mid-May	306 (100)	306 (100)	232 ( 76)	467 (153)
First Week in June	244 ( 80)	306 (100)	252 ( 82)	467 (153)
Mid-July	253 ( 83)	276 ( 90)	338 (110)	404 (132)
Late July-August	181 ( 59)	214 ( 70)	265 ( 87)	208 ( 92)

\* Based on 306 water areas considered to be normal for the area.  
Figures in parenthesis are percentages.

In addition to much higher water levels in 1955 we find that the number of water areas also increased considerably (Table I.) and there were more ponds during each one of the censuses than at any similar period during the four-year study.

The Breeding Population

Two censuses of breeding pairs were made each year, the first beginning May 10, and the second about three weeks later or during the first week in June. Results are as follows:

Table II. - Breeding Pair Census - Redvers Study Area.

	1952	1953	1954	1955	1952	1953	1954	1955
Mallard	265	258	215	174	44.1	43.6	42.4	39.7
B-w. Teal	142	150	95	109	23.6	25.3	18.7	25.0
Pintail	64	55	73	44	10.6	9.3	14.4	10.1
Baldpate	32	31	42	22	5.3	5.2	8.3	5.0
G-w. Teal	32	34	30	15	5.3	5.7	5.9	3.4
Canvasback	23	24	24	25	3.8	4.0	4.7	5.7
Shoveler	12	13	14	11	2.0	2.2	2.8	2.5
L. Scaup	15	12	4	15	2.5	2.0	0.8	3.4
Gadwall	7	6	8	3	1.2	1.0	1.6	0.7
Ringneck	4	4	1	3	0.7	0.7	0.2	0.7
Redhead	4	4	1	8	0.7	0.7	0.2	1.8
Ruddy	1	1	0	9	0.2	0.2	0.0	2.0
Total	601	592	507	438	100.0	100.0	100.0	100.0
Per Sq. Mi.	120	118	101	88				

Although there was an 150 percent increase in the number of water areas on the Redvers Study Area in 1955, the breeding pair population was at its lowest point in four years. Two possible explanations for this drop in population are: (1) very poor brood production in 1954, and (2) abundant water on the prairie to the south and west may have attracted some breeders.

In analyzing the data by species, however, we find that some species actually increased over 1954 and the canvasback, scaup, redhead and ruddy duck were at the highest breeding peak in the entire four-year period. The lack of breeding ponds in South Dakota and the southern half of North Dakota no doubt also had an effect on Saskatchewan breeding populations. It is very likely that lack of habitat in the Dakotas caused the increase in divers and blue-wings plus the tremendous increase in the coot population which jumped from a norm of 5 or 10 pairs to 140 pairs in 1955.

Actually the 1955 population was 69 pairs less than in 1954 and the mallard-pintail breeding pair population dropped 70 pairs. Baldpate, green-wings and gadwall also decreased.

Nesting Success

Five hundred and ninety-one nests were located during the nesting season of 1955 as compared to 601 in 1954. The accompanying map shows distribution of nests found in relation to the study area. Twenty-seven percent of the nests were found by a black Labrador dog.

Table III lists nest success data for both active and inactive nests, the former being those from which a hen was flushed and the nests followed through to completion. Inactive mallard nests (destroyed-when-found or hatched-when-found) were again a poor yardstick of success due to the extreme difficulty of finding the latter in the rank, heavy cover during late June and July. An abundance of destroyed-when-found nests in May indicates high predation early in the season and also precludes the possibility of high nesting success for the initial nesting attempt. In this respect destroyed-when-found nest data is valuable for early estimates of potential production.

Table III. - Nest Data Summary - Redvers Study Area.

Species	Total Found	Abandoned *	Total Left	Destroyed	Hatched	Percent Success
Mallard	435	24	411	305	106	25.8
B-w. Teal	62	8	54	35	19	35.2
Pintail	14	0	14	6	8	57.1
Canvasback	23	0	23	3	20	87.0
Baldpate	9	2	7	2	5	71.4
L. Scaup	20	1	19	9	10	52.6
G-w. Teal	8	2	6	5	1	16.7
Ringneck	12	1	11	5	6	54.5
Redhead	1	0	1	0	1	100.0
Shoveler	1	0	1	1	0	00.0
Gadwall	6	0	6	1	5	83.3
Total	591	38	553	372	181	32.7

\* These nests were apparently abandoned due to the observer finding the nest.

Table IV. - Summary of Active Nests Only.

Species	Total Number of Active Nests	Destroyed	Hatched	Percent of Success		
				1953	1954	1955
Mallard	245	150	95	48.9	24.1	38.8
B.-w. Teal	36	18	18	37.0	25.6	50.0
Pintail	13	5	8	59.1	36.8	61.5
Canvasback	19	3	16	70.8	52.0	84.0
Baldpate	7	2	5	25.0	16.7	71.4
L. Scaup	19	9	10	57.1	57.1	52.6
G.-w. Teal	5	4	1	66.7	0.0	20.0
Ringneck	10	4	6	60.0	44.4	60.0
Redhead	1	0	1	25.0	100.0	100.0
Shoveler	1	1	0	100.0	40.0	0.0
Gadwall	6	1	5	100.0	60.0	83.3
Total	362	213	149	50.1	28.0	41.2

From Table IV. we see that nesting success in 1955 was higher for nearly all species than it was in 1954 and for most species better than in 1953. However, mallard success did not reach the high of 1953. The 1955 season was early with mallards, pintails and canvasback getting an early start at nesting. First nesting attempts of mallards were hit very hard but later on the species did very well as did all other late nesting species.

Table V. - Causes of Nest Destruction - Active Nests Only.

	Percent of Total			
	1952	1953	1954	1955
Crows and Magpies	33	43	33	50
Skunk	40	24	32	31
Ground Squirrels	16	12	12	5
Other Mammals	4	5	4	8
Flooding	0	3	11	1
Agriculture	2	7	1	2
Unknown	5	6	6	3
Total	100	100	100	100

The data in Table V. indicates that crows and magpies were responsible for 50 percent of the nest destruction in 1955. However of the destroyed-when-found nests, skunks took nearly 60 percent. This is not a true measure of predation, however, because destroyed-when-found nests taken by skunks are easier to find than those where crows have removed all eggs. It does indicate a heavier loss to skunks early in the season before mice litters, insects and beetles were available as skunk food.

The higher nesting success in 1955 as compared to 1954, for example, is attributed to a more nearly normal production of predator foods which took pressure off of duck nests especially after June 1.

#### Brood Production

A brood census to determine production was taken on July 6 to 13 and again on July 27 to August 1. These censuses were taken about a week earlier than 1953 and 1954 but a few days later than in 1952. Using three different methods of calculating brood production from the two censuses we came up with figures of 183, 192, and 193 respectively. As in 1954, the final brood count gave the highest production and seems to be the best indicator of total production.

Total brood production in 1955 compared to previous years is illustrated in Table VI.

Table VI. - Brood Population (Total Calculated Production).

	1952	1953	1954	1955	Percent Change In 1955 From "PAR" *
Mallard	122	101	45	71	- 36%
B-w. Teal	62	63	21	39	- 37%
Pintail	19	20	5	8	- 58%
Baldpate	12	18	6	14	- 7%
G-w. Teal	14	6	4	3	- 67%
Canvasback	9	19	7	26	+ 86%
L. Scaup	2	8	2	7	+ 40%
Shoveler	6	6	5	8	+ 33%
Gadwall	2	2	0	3	+ 50%
Ringneck	1	1	0	3	+200%
Redhead	0	2	2	4	+100%
Ruddy	0	0	0	7	-
 Total	 249	 246	 97	 193	 - 22%
Remaining Potential **	14	17	16	12	

\* Percent change from 1952-1953 average. These years the Redvers Area was considered to be at nearly maximum carrying capacity.

\*\* Remaining potential includes pairs, lone drakes and lone females on area.

From Table VI. we find that most of the puddle ducks were below par in 1955 and all of the divers were above par. When grouped together the puddle ducks were down 35 percent while the divers were up 74 percent. The decrease in puddle ducks can be attributed to two possible causes: (1) poor production on the area in 1954, and (2) increase in puddle duck habitat on the Regina Plains area which is immediately adjacent to the study area.

The increase in divers along with nearly a 1,000 percent increase in coots was very likely due to the spring drouth in the Dakotas which caused birds to move northward.

By subtracting the remaining potential as of August, from the breeding pair counts in Table II, and comparing them to the brood population in Table VI., the success of the breeding pairs (percent of successful females) can be approximated as follows:

Table VII. - Percent of Females Producing Broods.

	1952	1953	1954	1955
Mallard	46.2	39.1	21.3	42.3
B-w. Teal	46.3	42.0	23.3	36.4
Pintail	29.7	37.0	6.9	18.2
Baldpate	40.0	66.7	15.0	64.0
G-w. Teal	46.7	19.3	13.3	20.0
Canvasback	39.1	86.4	30.4	100.0
Others	26.2	50.0	33.3	71.0
<hr/>				
Averages	42.4	42.8	19.7	45.3

Thus from Table VII. we find that although total brood production was 22 percent below par in 1955, the actual percentage of successful females was higher than any previous year according to our brood data. Nesting data did not indicate better success in 1955 than in 1953 (See Table IV.) but it must be remembered that this is "raw" nesting success data and is not corrected for renesting attempts.

However, for the fourth consecutive year raw nesting success data and broods produced per female have paralleled each other quite closely.

**Table VIII. - Nest Versus Brood Data.**

	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>
<b>Mallard</b>				
Nesting success in percent	56.9	48.9	24.1	38.8
Percent of successful females	46.2	39.1	21.3	42.3
<b>All Species</b>				
Nesting success in percent	49.5	50.1	28.0	41.2
Percent of successful females	42.4	42.8	18.7	45.3

From either set of data we would conclude that there was no great change in rate of reproduction between 1952 and 1953; that there was a decided drop in production per breeding pair in 1954; and that in 1955 production got back to normal again. Thus it appears that nesting data as well as brood data, can be used to indicate trends, and a forecast of the season's production can be made at least a month earlier from nesting data. This statement applies specifically to a study area but logically may be projected to a larger segment of country of which a given study area may be typical.

**Brood Averages**

Brood averages from the Redvers Study Area and from a radius of not more than 20 miles distant, follow in Table IX.

**Table IX. - Brood Averages by Age Classes.**

	Class Ia				Class III				All Age Classes			
	1952	1953	1954	1955	1952	1953	1954	1955	1952	1953	1954	1955
Mallard	6.96	6.91	6.14	7.56	6.13	6.55	5.47	6.10	6.42	6.74	5.98	6.59
B-w. Teal	8.87	8.50	8.88	8.95	7.25	7.98	8.83	8.45	7.94	8.21	8.66	8.54
Pintail	6.40	7.12	4.50	7.25	5.00	5.19	4.18	5.50	5.62	5.82	4.38	6.50
Baldpate	8.40	7.68	8.15	7.16	7.00	7.15	-	7.57	7.81	7.23	7.19	7.21
Canvasback	7.25	6.42	5.64	6.96	5.64	6.07	3.75	6.29	6.28	6.43	4.66	6.58

Brood averages in general appear to be average for 1955 except for canvasback which showed a definite increase in nearly all age classes. Canvasback data in 1955 is based on 267 broods and 1,757 individuals.

### Roadside Brood Counts

Results of roadside brood counts for the four-year period follow:

	1952	1953	1954	1955
Total Miles Covered	157	157	190	190
Total Broods Seen	251	342	151	368
Broods Per Lineal Mile	1.60	2.18	0.79	1.93

We explained in our 1953 report that the roadside count showed an increase in that year over 1952 which actually didn't occur. The roadside count was high in 1953 due to the later nesting season which caused a telescoping of the brooding season. In 1954 the breeding season was also telescoped and that year the reduction of 64 percent from 1953 compared almost exactly to the 61 percent decrease found on beat-outs. In 1955 we found a 99 percent increase in broods on the beat-out brood counts over 1954 but 22 percent less than in 1953. On the roadside count in 1955 we found 144 percent more broods per lineal mile than in 1954 and 12 percent less than in 1953.

Roadside transects by automobile are subject to the same errors as aerial brood counts. Changes in amount of emergent vegetation, water levels and in shoreline vegetation all affect accuracy between years. For some species such as most diving ducks and for the baldpate, the method is good. For mallards, and pintails it is especially bad. A series of compensatory factors can be worked out to apply to each species but this in itself would require several years of intensive study in order to encounter all the various fluctuations in visibility due to environment changes.

### Banding

Banding returns from 1953 and 1954 on or adjacent to the Redvers Study Area are shown below:

#### Number and Location of Returns - 1953

Species	No. Banded	1st. Yr.	Return/Year	No. 2nd.	Pac. Cen. Miss. Atlan. Central					
					Canada	Flyway	Flyway	Flyway	Flyway	American
Mallard	196	16.3	4	12	0	14	10	0	0	0
B-w. Teal	51	3.9	1	1	0	1	1	0	0	0
Baldpate	31	12.9	1	1	0	2	0	1	1	1
Pintail	13	30.7	0	0	1	2	1	0	0	0
Shoveler	11	9.1	0	0	0	0	0	1	0	0
Canvasback	7	14.1	1	1	0	0	0	1	0	0
Redhead	3	33.3	0	1	0	0	0	0	0	0
Total	312	14.4	7	16	1	19	12	3	1	
Percent	0	0	0	30.8	1.9	36.5	23.1	5.8	1.9	

Number and Location of Returns - 1954

Species Banded	No.	First Yr.	No.	Pacific Central Miss. Atlantic Central				
		Returns/ 100 Banded	Second 100 Banded Returns	Pacific Canada Flyway	Central Flyway	Miss. Flyway	Atlantic Flyway	American
Mallard	38	28.9	0	4	0	2	4	1
Pintail	14	7.1	0	1	0	0	0	0
B-w. Teal	10	0.0	0	0	0	0	0	0
Baldpate	9	11.1	0	0	0	0	1	0
Canvas.	4	50.0	0	0	0	0	1	1
G-w. Teal	2	0.0	0	0	0	0	0	0
Shoveler	2	0.0	0	0	0	0	0	0
Total	79	19.0	0	5	0	2	6	2
Percent	0	0	0	33.3	0	13.3	40.0	13.3

Significant facts from the above data are:

(1) Large number of returns (31 percent) from the immediate vicinity of the banding station.

(2) Wide distribution of returns which range from Saskatchewan to California and Texas and from Ontario to Florida and Central America.

(3) Rather high rate of return in 1954 which was a year of extremely late nesting.

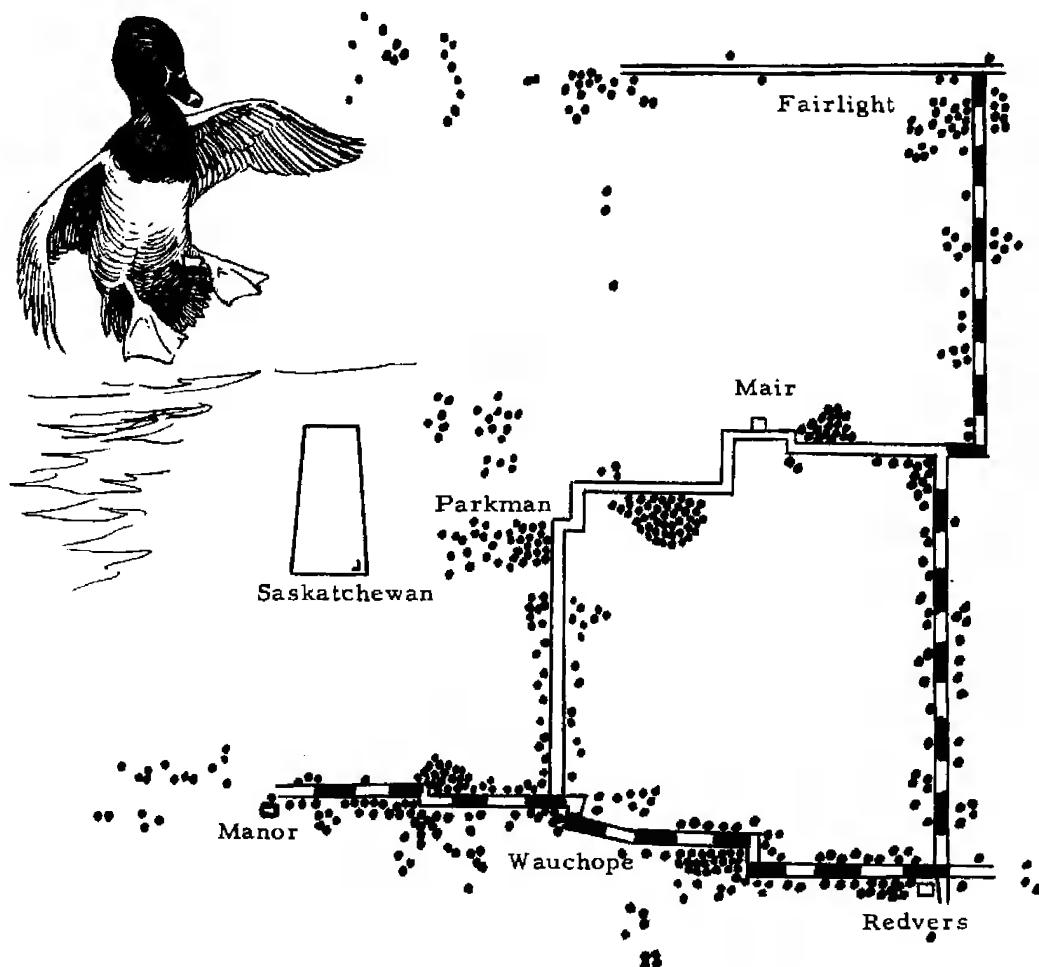
Due to improved conditions in 1955, 471 ducks and 22 coot were banded as follows:

Ducks Banded - June, July and August - 1955 (Redvers Study Area).

	AM	JM	AF	JF	L?	Total
Mallard	1	92	4	99	-	196
Gadwall	0	2	1	0	0	3
Baldpate	0	14	0	17	0	31
Pintail	1	26	0	25	0	52
G-w. Teal	1	2	0	6	0	9
B-w. Teal	0	44	0	62	1	107
Shoveler	0	15	0	13	0	28
Canvasback	0	15	0	16	1	32
Scaup	0	2	0	2	1	5
Redhead	0	2	0	2	0	4
Ringneck	0	4	0	0	0	4
Total	3	218	5	242	3	471
Coot						22

All but 50 of the above birds were retrieved or pinned down by the black Labrador dog, Dinah. In other words, the dog was responsible for catching 90 percent of the banded birds.

REDVERS STUDY AREA TRANSECT AND  
ADJOINING AREA



Legend

Study Area



Locations of nests •

Figure 1.



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## WATERFOWL BREEDING GROUND SURVEY IN SASKATCHEWAN, 1955

### KINDERSLEY STUDY AREA

J. B. Gollop and R. W. Fyfe

#### Introduction

Intensive breeding pair and brood surveys in the Kindersley Study Area were abandoned this year and greater emphasis was put on investigation of mallard renesting and the dispersal of locally raised mallards, both projects being phases of a study of waterfowl depredation on cereal crops.

Other personnel participating in the project were Messrs. R. L. Mosher (May-July), W. H. Beck (August), N. G. Perret (August, part), W. J. Fisher (July, part) and D. A. Munro (May and July, part), for the Canadian Wildlife Service, and Wes Schmidt (June-July, part) for the Saskatchewan Game Branch.

#### Weather and Water Conditions

Water levels in May, 1955, were better than in the previous spring. Precipitation, 70 percent greater than normal between April 1 and May 15, helped maintain this situation and caused no serious setbacks to nesting. By June 20, however, the season's rainfall was down to normal (3.46" at Kindersley). Five to six inches of rain during the first ten days of July put many sloughs in better shape than they had been in May, but this flood was followed by two months of drought (less than one and one-half inch precipitation) and by mid-September many sloughs were dry for the first time since 1951. Mean monthly temperatures for the mid-July - mid-September period were about two degrees Fahrenheit above normal.

#### Breeding Pair and Production Data

On May 16 an attempt was made to census a block (18 x 22 miles) west of Kindersley by flying every other north-south mile line. However, a partial ground-air comparison indicated serious deficiencies in such an aerial effort carried out by inexperienced persons. A less complete coverage of the same area on May 28 by U. S. Fish and Wildlife Service personnel was too late (as was the May 16 effort) to determine the status of breeding mallards.

Nest hunting was carried out mainly for the purpose of trapping and marking mallard hens and newly hatched broods so as to obtain data on renesting, movement, and development. The highest nesting density for a large area was 99 nests of nine species found in a 0.75-square mile area between May 9 and June 22; 57 of the nests were of mallards. Natural predation appeared to be negligible. Many early nests (mainly of pintail) in stubble that was reseeded this year were probably wholly or partly destroyed by seeding operations which were underway by May 10.

The first mallard brood apparently hatched about May 17 and the last about August 29. The peak period for the first mallard hatch was May 25 to June 7--about two weeks earlier than in 1954. Average clutch and brood sizes were as follows:

Species	Incubated Nests (1955)	Class I Broods	
		June 13-18, 1955	June 12-July 2, 1954
Mallard	9.9 eggs (84 nests)	6.2 Y. (152 Br.)	6.4 Y. (46 Br.)
Pintail	8.9 eggs (34 nests)	4.8 Y. ( 53 Br.)	5.6 Y. (25 Br.)

A 246-square mile observation-type transect (not beat-out) of sloughs with little or no emergent vegetation was made between June 13 and 18. It gave an average of 4.2 broods per non-emergent slough and an over-all density for sloughs of 0.6 per square mile. Five of the 79 non-emergent sloughs accounted for 156 broods; 28 were recorded as unoccupied. The following counts, made during banding drives on open sloughs, further illustrate the clustering of broods:

Date	Location	Area	Young & Hens - All Species
June 29	SE Pinkham	65+ acres	600+ Ducks
July 6	"	55+ "	240+ "
July 13	S Marengo	100+ "	300+ "
July 14	SW Flaxcombe	60+ "	275+ "
July 15	SW Fairmount	30+ "	270+ "
July 17	SE Smiley	160+ "	900+ "
July 22	NW Eatonia	140+ "	285+ "

Considering water area alone and the fact that the duck figures are one day (rather than full season) counts, production for the square mile of water covered by the above seven sloughs was more than 400 broods. Larger water areas, however, were not found to produce ducks in such abundance. A careful aerial coverage of the shoreline (64+ miles) of three large sloughs (17+ square miles) in the same area on June 24 disclosed signs of only 48 broods.

### Banding

The 1955 banding data are summarized in Table II.

Between May 15 and June 21, 59 mallard hens were trapped on nests. Thirty-one of these were trapped and neckbanded in 0.75 square mile of habitat between May 15 and 22; all lost their nests and nine were found renesting in the same area.

Between June 21 and August 19, 1,506 flightless young mallards were banded; 786 of these were also neckbanded as an aid in determining dispersal. More than half of the total were caught by dogs; drive-trapping accounted for the remainder. Two, two-man crews, working separately with a year-old Chesapeake retriever and a three-year old Labrador retriever cross, banded 683 of the local mallards in the equivalent of nine full days between July 14 and August 15.

During the 1955 banding operations seven hen mallards banded in 1954 were recaptured. Five had been banded as flightless young and two had been adults with broods the previous year; four of the five young had been neckbanded and one still had its neckband intact. All seven were retrapped less than two miles from their 1954 banding locations.

#### Direct Returns of Locally-Raised Mallards Banded in the Kindersley District - 1952-1954

These recoveries are summarized in Table III. No attempt has been made to adjust them for differential hunting pressures. Neckbanded and normal mallards are included.

The 1954 direct recovery rate (after allowing for a 10 percent loss through deaths caused by neckbands) was about eight percent. Direct returns within 50 miles of the banding area when compared to total returns have varied from 22 to 54 percent. (See Table I).

Although recoveries from Texas and Arkansas accounted for 21 percent of the United States recoveries accumulated for the three years, all recoveries from these States were for 1954 bandings.

Table I. - Comparison of Local to Total Recoveries.

Year	Total Banded	Total Returns	Percent
			Local Returns
1952	88	12	25
1953	525	48	54
1954	1,572	116	22

Table II. - Kindersley Banding - May 15 to August 19, 1955.

Species	Flightless Young	Adults			Total
		Territorial Females	Moultng Females	Moultng Males	
Mallard*	1,506	72	3	24	1,605
Pintail	195	7	-	-	202
Gadwall	-	1	-	-	1
Baldpate	-	1	-	-	1
Total Ducks	1,701	81	3	24	1,809
Other Birds (4 species; 373 gulls)					378
* Of which the following were neckbanded:	786	49	-	5	840

Table III. - Direct Recoveries for Flightless Young Mallards Banded at  
Kindersley - 1952 - 1954.

Canada	U. S. Flyways					Atlantic	
	Pacific	Central	Mississippi	Georgia	Maryland		
Alberta	3	California	5	Colorado	1	Alabama	1
Saskatchewan		Idaho	5	Kansas	8	Arkansas	8
50-miles	54	Oregon	2	Montana	4	Illinois	8
50+miles	3	Washington	1	Nebraska	8	Indiana	1
				No. Dak.	2	Iowa	3
				Oklahoma	4	Kentucky	1
				So. Dak.	10	Louisiana	12
				Texas	16	Minnesota	1
				Wyoming	1	Missouri	12
Total	60	13	54	47			2
Grand Total -	176						

## WATERFOWL BREEDING GROUND SURVEY IN SOUTHERN MANITOBA, 1955

Charles D. Evans

### Introduction

This report will deal with the aerial surveys conducted in the southern (parkland) portion of Manitoba covering Strata "A" and "B" as well as the operations of the banding crew and the special study area crew.

### Personnel

#### Aerial Crew - (Piper PA-18)

May Survey: C. D. Evans, Pilot, U. S. Fish and Wildlife Service, and N. G. Perret, Observer, Canadian Wildlife Service

July Survey: J. D. Smith, Pilot, U. S. Fish and Wildlife Service, and N. G. Perret, Observer, Canadian Wildlife Service

#### Ground Crew - Special Study Area

Gerald Pospichal, U. S. Fish and Wildlife Service,  
Barclay Cram, Manitoba Game Branch, and  
J. A. Serafin, Manitoba Game Branch

#### Banding Crew

Rex C. Tice, U. S. Fish and Wildlife Service,  
V. A. Blazevic, U. S. Fish and Wildlife Service,  
Floyd Blackmore, University of Illinois,  
Hugh Erwin, Arkansas Department of Conservation, and  
Brice Metzger, Ohio Department of Conservation

Other studies were carried on by University of Wisconsin students, Alex Dzubin in the pothole country, S. T. Dillon on the Delta Marsh, and Robert Klopman at Dog Lake, all under the auspices of the Wildlife Management Institute.

#### Weather and Water Conditions

The high water levels remaining at freeze-up in 1954 were followed by a mild open winter through January. Heavy snows in February and March, followed by a very rapid break-up in late March, filled the ordinarily dry potholes in the southwestern portion of the Province and caused severe flooding throughout the remainder, particularly in the river valleys and large marshes. This was

followed by heavy rains in May, June and early July which maintained high water levels and retarded seeding throughout most of the Province. Precipitation from early April to mid-July ran from two to over four inches above normal, while temperatures were generally above normal.

Tables I and II show the aerial pond count for May and July as compared to the four previous years.

Table I. - May Water Area Indices - Southern Manitoba Aerial Survey.

Year	Ponds in Stratum A	Ponds in Stratum B	Total
1951	240,500	185,900	426,400
1952	174,200	155,400	329,600
1953	186,600	311,700	498,300
1954	258,200	1,075,400	1,333,600
1955	314,700	427,700	742,400

Table II. - July Water Area Indices - Southern Manitoba Aerial Survey.

Year	Ponds in Stratum A	Ponds in Stratum B	Total
1951	87,200	No Record	-
1952	126,000	No Record	-
1953	150,900	No Record	-
1954	472,400	384,200	856,600
1955	339,300	270,900	610,200

Although the data show a decrease in the number of ponds from 1954 to 1955, there was actually more water present this year both in May and July. Part of the discrepancy is caused by our having counted considerable sheet water and ditches in 1954, mainly in the flat plains of Stratum "B", and part is caused by the fact that the flooded conditions in 1955 often were sufficient to combine several small potholes into one large one.

Most of the rise in water levels occurred before the nesting season, and subsequent rises were not severe enough to cause extensive flooding of nests. The delayed seeding took place when most of the mallards and pintails were incubating. However, in Manitoba there is little nesting attempted in grain stubble, so it is probable that this was not a serious factor.

High water considerably reduced nesting cover for diving ducks. This was particularly evident on the large marshes where most hard-stem bulrush and cattail from the previous year was useless and the new growth delayed. However,

the adaptability of most species of ducks led to their seeking different types of cover for nesting, rather than causing them to move elsewhere.

The spring migration in 1955 was the earliest on record. Reports from the Delta Station indicate that all species were represented by April 15. Early migrants, such as mallard and pintail, arrived in numbers by April 1.

Nesting of mallard and pintail was reported by officers of the Manitoba Game Branch to be underway by mid-April. By May 5 many hens of these species were incubating, as was evidenced by gatherings of drakes. The first significant hatch occurred between May 25 and June 1.

With the exception of possible effects of reduction of nesting cover, conditions were ideal throughout the southern portion of the Province.

#### Breeding Population

Breeding populations for 1954 and 1955 are shown in Tables III and IV. There was a considerable increase this year, particularly in Stratum "B". The increased use of Stratum "B" was also accompanied by a much wider dispersal of birds in Stratum "A", particularly into the normally droughty southern portion of the Stratum. This may have been due to the abundant water and early break-up.

The greatest increase was in ruddy ducks and coots, probably reflecting the preference of these species for regions with high water levels. Pintails also showed a marked increase, mainly in Stratum "B". The only important decrease was in the canvasback. Although the decrease was slight, the variation from the trend shown by other species is quite considerable.

Included in Tables III and IV are "flocked scaup". These are birds seen in groups of mixed sexes which are judged to be migrants or non-breeding summer residents. They are almost certainly not a part of the nesting population of the area and have thus not been corrected for unseen hens on nests in the analysis of the 1954 and 1955 data.

Breeding populations for 1951-1955 are shown in Table V. Due to the exclusion of non-breeding scaup in 1954 and 1955, these two years have been slightly undervalued. The index for 1951 is also somewhat undervalued due to the fact that no correction was made for absent hens on nests in Stratum "B".

This year's spring population was considerably above that of the previous three years and slightly higher than that of 1951.

The progress of nesting is indicated by the proportion of drakes which are seen without hens, the latter presumably being hidden on their nests. Table VI shows this ratio from 1951 through 1955. The early season of 1955 was reflected in a very high percentage of lone males, indicating that nesting was well underway.

Table III. - Species Composition of the May, 1954 Waterfowl Population of Southern Manitoba.

Species	Stratum A	Stratum B	Stratum A & B	% Composition
Pintail	35,500	26,900	62,400	11.4
Mallard	134,400	118,100	252,500	46.3
Baldpate	9,500	7,600	17,100	3.1
Shoveler	10,200	8,600	18,800	3.4
Gadwall	7,300	1,000	8,300	1.5
Blue-winged Teal	44,400	22,300	66,700	12.2
Green-winged Teal	2,800	5,100	7,900	1.4
Scaup	20,000	20,300	40,300	7.4
Canvasback	26,200	4,100	30,300	5.6
Redhead	13,000	4,600	17,600	3.2
Ringneck	3,600	500	4,100	.8
Ruddy Duck	3,500	1,000	4,500	.8
Goldeneye	2,300	4,100	6,400	1.2
Bufflehead	3,800	4,100	7,900	1.4
Scoter	300	-	300	.1
Merganser	300	-	300	.1
Total	317,100	228,300	545,400	99.9
Coot	10,600	2,800	13,400	
Flocked Scaup	35,700	16,700	52,400	

**Table IV. - Species Composition of the May, 1955 Waterfowl Population  
of Southern Manitoba.**

Species	Stratum A	Stratum B	Strata A & B	% Composition	% Change 1954-1955
Pintail	48,900	80,600	129,500	16.8	+108
Mallard	137,300	218,400	355,700	46.2	+ 41
Baldpate	11,200	16,500	27,700	3.6	+ 62
Shoveler	12,800	12,300	25,100	3.3	+ 34
Gadwall	4,900	3,300	8,200	1.1	- 12
B-w. Teal	47,500	40,300	87,800	11.4	+ 32
G-w. Teal	1,400	2,500	3,900	.5	- 51
Scaup	30,200	23,800	54,000	7.0	+ 34
Canvasback	22,500	5,900	28,400	3.7	- 6
Redhead	14,600	10,600	25,200	3.3	+ 43
Ringneck	1,500	-	1,500	.2	- 63
Ruddy	10,600	1,700	12,300	1.6	+173
Goldeneye	700	3,300	4,000	.5	- 38
Bufflehead	700	5,000	5,700	.7	- 28
Scoter	200	-	200	Tr.	- 33
Merganser	100	-	100	Tr.	- 67
Total	345,100	424,200	769,300	99.9	+ 41
Coot	16,200	12,300	28,500		+113
Flocked Scaup	57,300	16,500	73,800		+ 41

**Table V. - May Waterfowl Population Indices - Southern Manitoba Aerial Survey.**

Year	Stratum A 10,368 Sq. Mi.	Stratum B 28,600 Sq. Mi.	Strata A and B
1951	472,800	165,900**	638,700**
1952	343,200	177,300	520,500
1953	209,400	151,600	361,000
1954*	317,100	228,300	545,400
1955*	345,100	424,200	769,300

% Change, 1954-1955 +12% +86% +41%

\* The 1954 and 1955 data do not include scaup seen in flocks and considered to be non-breeders. These amounted to 52,400 in 1954 and 73,800 in 1955. (Nearly 10 percent of the total duck population.)

\*\* Stratum "B" data for 1951 are not corrected for absent hens, and show a lower population than would treatment similar to the four subsequent years.

Table VI. - Percent Lone Males,\* Southern Manitoba, May Aerial Survey.

Year	% Lone Males In Stratum A	% Lone Males In Stratum B	% Lone Males In Stratum A & B
1951	45.1%	68.0%	51.0%
1952	49.4%	37.6%	45.9%
1953	45.4%	51.3%	47.9%
1954	56.3%	67.7%	61.1%
1955	65.8%	77.1%	72.0%

\* The ratio of drakes without hens to all drakes seen.

The factors of population, water and percent lone males may be combined in a forecast index as shown in Figure 1. Each factor is given an appropriate value, further corrected for additional weighting. The sum of these factors is the forecast index. The average index is the sum of the average of each factor, rather than the average of the values or indices.

In arriving at the index, the greatest weight is given to the spring population. Water in Manitoba is generally not a critical item and is often super-abundant. Thus, water has been given a low value which has very little effect on the index above 20 ponds per square mile. The lone male is given intermediate weight. On this basis, the 1955 forecast index is 22 percent above the average and 14 percent above 1955.

#### Production

The 1955 aerial production survey was run from July 4 to 12 in Stratum "A" and July 10 to 14 in Stratum "B". Due to the early phenology of the 1955 season, this was perhaps somewhat later than optimum. However, the earliest significant hatch occurred between May 25 and June 1. Allowing 46 and 52 days for pintails and mallards respectively<sup>1</sup> to reach flying age, the first hatch should not have been flying before July 10 and July 16 for the two species.

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<sup>1</sup> Gollop, J. B. and Marshall, W. H.,

1954 - A Guide to Ageing Duck Broods in the Field. Miss. Flyway Council Tech. Section Bulletin.

This, and the fact that the aerial crew recorded only three flying broods, indicate that the survey was not so late that significant numbers of broods were flying and lost to the records. However, bad weather in the form of persistent high winds undoubtedly served to depress the number of broods seen.

Table VII shows the Stratum "A" July population indices for 1951-1955. Comparisons on the basis of broods alone are of limited value. The factor of "potential later broods" is of some assistance in orienting the count in the total season's production. These birds presumably indicate the strength of continued nesting effort and broods to come. These two indices represent unknown percentages seen of populations actually present, and the potential of the latter figure is unknown. Thus, these figures cannot be added but must be considered separately. With the exception of "potential later coot broods," these data show a decrease from 1954, although all are considerably higher than 1953. Comparisons with 1951 and 1952 are difficult without data on "potential later broods" (1951), or more knowledge of the effect of extreme fluctuation in the figure (1952).

In 1954 and 1955, production surveys were also run in Stratum "B". Although duck densities there are low, it produces a large portion of southern Manitoba ducks due to its larger size. Table VIII shows population data from Stratum "B". With the exception of "potential later broods," there was a slight decrease from 1954.

Table VII. - July Brood Indices - Stratum A, Manitoba Aerial Survey.

Year	Brood Index	Index to Potential Later Broods*	Coot Brd. Index	Index to Potential Later Coot Broods*
1951	33,200	No Data	No Data	No Data
1952	32,100	4,600	No Data	No Data
1953	8,000	23,000	600	No Data
1954	13,000	37,900	2,800	5,100
1955	11,600	29,100	2,100	7,400

\* "Potential Later Broods" consist of pairs, lone males and lone females. In the case of coots, the figure consist of singles and pairs.

Table VIII. - July Brood Indices - Stratum B, Manitoba Aerial Survey.

Year	Brood Index	Index to Potential Later Broods	Coot Brd. Index	Index to Potential Later Coot Broods
1954	14,600	17,500	3,200	1,100
1955	11,200	20,200	-	1,100

The phenology of the brood season may be indicated by the age distribution of broods as shown in Table IX. Although not as prominent as in 1954, there were many Class I broods seen on the survey, indicating that hatching was probably still underway, and that there were more broods to come. This was not true of Stratum "B" where relatively few broods were in Class I, as shown in Table X.

Table IX. - Age Class Distribution of Broods Stratum A, Manitoba Aerial Survey.

Year	No. of Brds. Aged	% in Class I	% in Class II	% in Class III
1951	710	40.7	40.7	18.6
1952	494	36.0	24.5	39.5
1953	150	22.0	43.3	34.7
1954	200	61.5	33.5	5.0
1955	172	41.9	30.2	27.9

Table X. - Age Class Distribution of Broods - Stratum B, Manitoba Aerial Survey.

Year	No. of Brds. Aged	% in Class I	% in Class II	% in Class III
1954	35	62.9	20.0	17.1
1955	23	17.4	43.5	39.1

Complete counts were made on very few broods, and there may be considerable selection of broods on which counts are made. However, data relating to the size Class II and III broods are presented in Table II. These data indicate that broods were smaller in 1955 than in the four previous years.

Table XI. - Number of Ducklings Per Class II and III Brood, Stratum A, Manitoba.

Year	No. of Broods Counted	Average Size
1951	7	7.4
1952	6	5.8
1953	22	7.0
1954	26	5.7
1955	28	5.6

The data may be combined into a forecast index as shown in Figure 2. The index is derived in the same manner as in May.

On the basis of the weights given the five factors, the forecast index for 1955 did not compare favorably with that for 1952 or 1954. However considering the high winds during the 1955 July survey leading to a low brood count, the probable greater ease with which May populations can be measured, and continued favorable nesting and brood conditions, it is believed that production in 1955 actually exceeded that of 1954.

#### Special Study Area

A new special study area was established this year in the parkland of Manitoba. This is a transect 40 miles long and one-eighth mile wide running roughly south from Minnedosa and west through Rapid City established to furnish data for ground-air comparisons and for studies of production.

No comparative data are available from previous years. However, the highest counts for each species when combined show densities of 113 pairs of ducks and 54 pairs of coots per square mile. The highest brood count showed a minimum density of 19.4 broods of ducks and 14 broods of coots per square mile. The transect contained 110 potholes per square mile representing 12.6 percent of the total area.

#### Banding

The banding crews again concentrated on flightless young which could be recorded as locally reared. They were captured by driving the broods into V-type traps set up on the margins of potholes. Efforts were concentrated in Stratum "A" where the majority of populations of sufficient density to warrant attempts at trapping are located. Due to the extreme high water and abundance of escape cover, trapping was even more difficult than is usual in the parklands.

WATERFOWL POPULATIONS AND PRODUCTION ON THE  
ROSENEATH STUDY AREA, SOUTHERN MANITOBA

1955

Alex Dzubin

Introduction

This report covers the 1955 population and production census for a small block of pothole-agricultural habitat in the Newdale - Erickson District of Manitoba. The 960-acre study block is situated nine miles south of Minnedosa, Manitoba. It contains one hundred and eight potholes, forty-five of which are classified as semi-permanent (Bach classification). Most of the temporary potholes are less than one acre in size while the semi-permanent areas vary from one to six acres. Cattail, whitetop, hardstem bulrush, and sedges are the main emergents.

Weather and Water Conditions

Break-up was very early this year and most water areas were free of ice by April 7. Heavy snowfalls during March, coupled with a very quick run-off from April 1 to 3, filled most depressions to overflowing. In over 90 percent of the potholes higher water levels were recorded than at any time during the previous five springs.

Mallards, blue-wing teals and canvasbacks arrived on the breeding ground a week to 10 days earlier than in 1954 or 1953. The subsequent nesting and brood season proved to be at least two weeks earlier than 1954 and could be compared phenologically with the 1952 nesting and brood periods.

Water conditions during the remainder of the nesting season were excellent. Heavy rains during May and June added much water to all potholes so that water levels remained far above normal for the rest of the brood season. These rains did not appear to interfere with hatching. Very few nests were flooded during 1955. In all, precipitation during the summer months was at least 30 percent above normal. Water levels remained excellent in all brood potholes on the study block.

Breeding Pair Census

The population of ducks was censused every week. The maximum number of any species observed during any one census period in May has been used as the breeding population for that species. A definite number of pairs of each species was then assigned to each quarter section.

Figure 1. - May Waterfowl Crop Outlook, Southern Manitoba, 1951-1955.

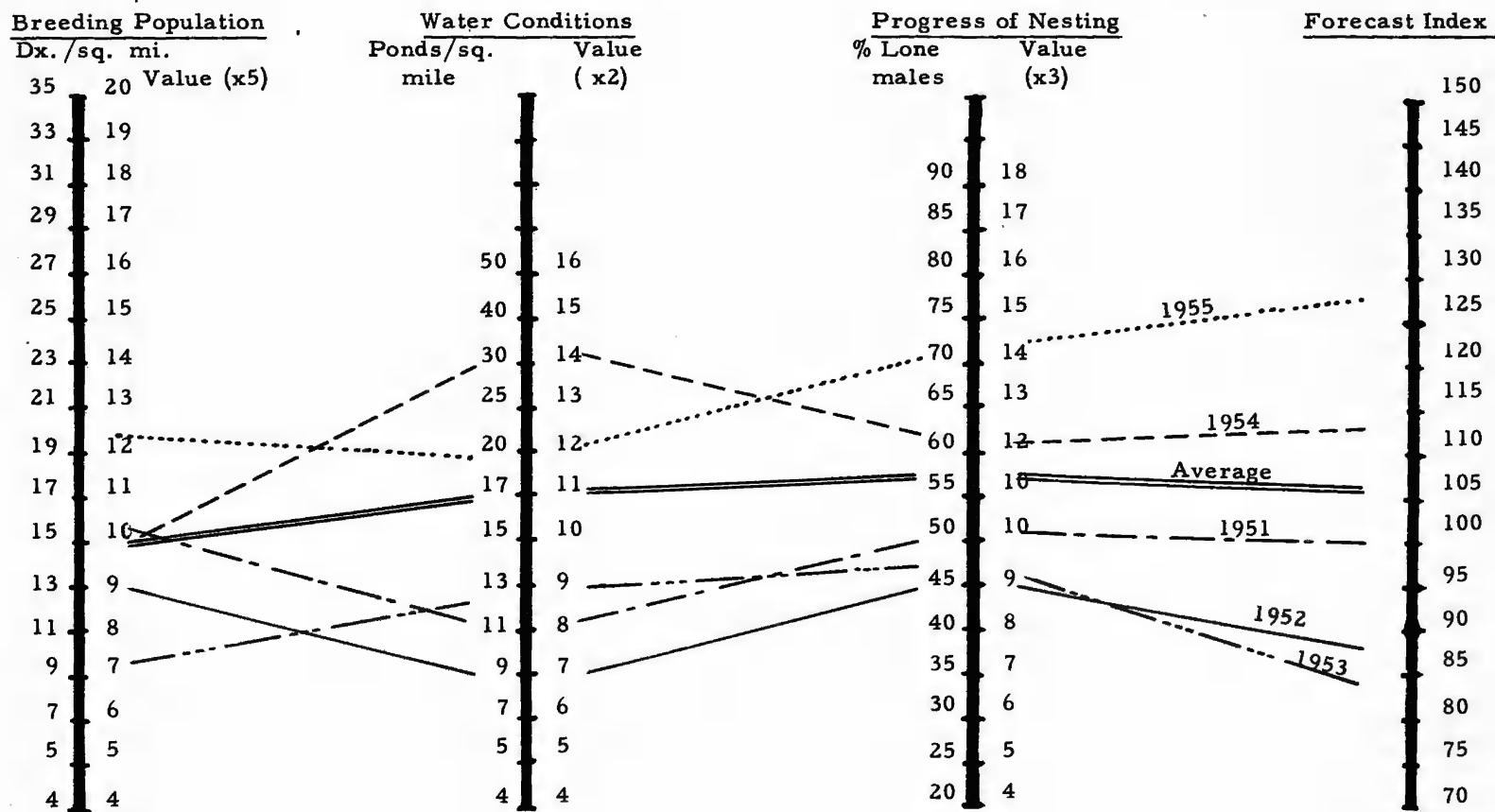
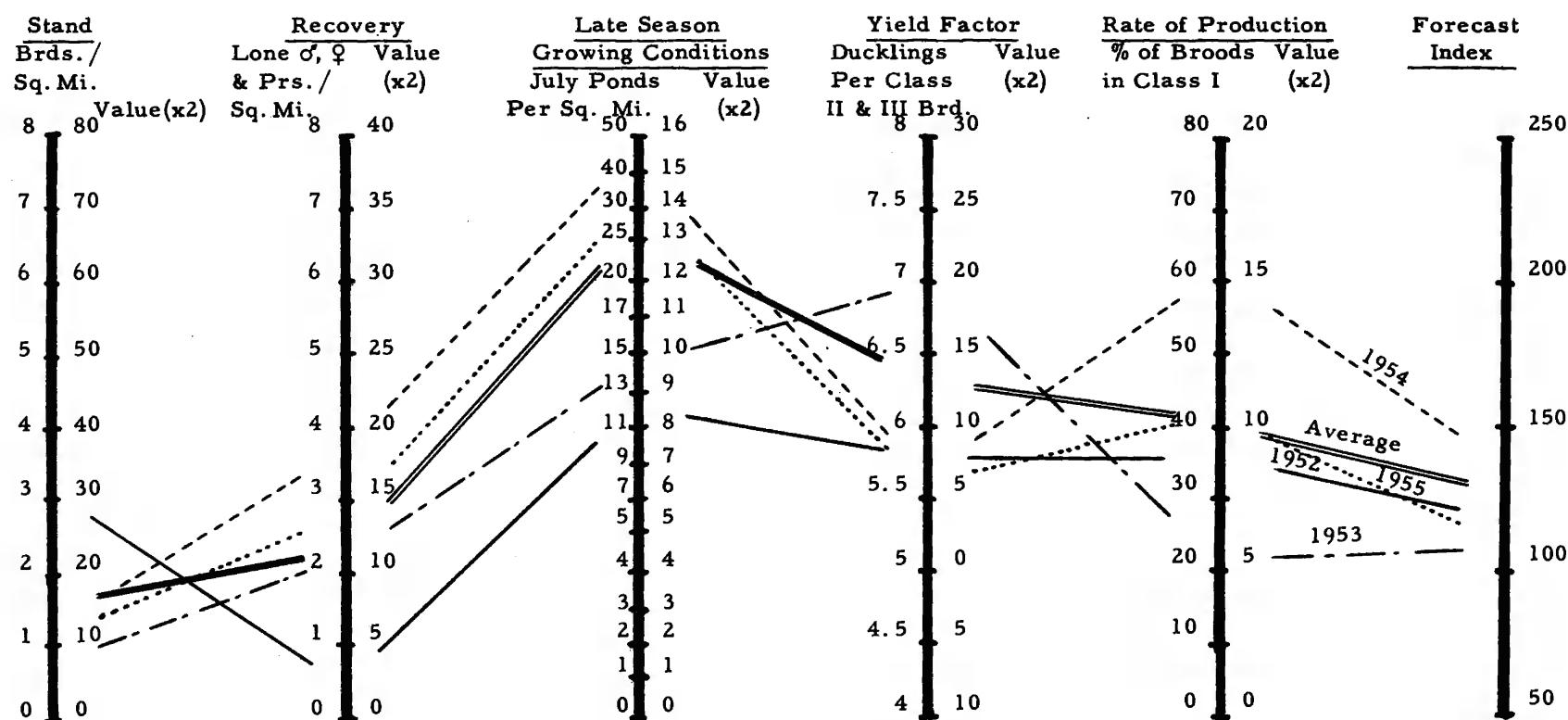


Figure 2. - July Waterfowl Crop Outlook, Stratum "A", Manitoba, 1952-1955.



The number of breeding pairs per square mile for the past four years is shown in Table I. There were no major fluctuations in the total number of breeding pairs per square mile during 1952, 1953 and 1954, but in 1955 the number of breeding pairs was 25 percent less than in 1954. The reduction was noted in all species except gadwall and ruddy duck.

Boom-trapping operations which were started in May did not appear to have any influence on population levels. The general decrease of waterfowl was noted in surrounding areas where such trapping was not carried on.

#### Brood Census

Three brood censuses were made of the study block, one on July 4, the second on July 25, and the third on August 30. All water areas were censused by the beat-out method (i. e. two or three men walked through all the emergent vegetation in the pothole). Flushed and feigning females were recorded as broods. During the second and third census all broods that appeared to be duplicates of the previous census were not added to the final tally. This method followed closely that outlined by Blankenship et al "Techniques for Brood Production Studies" and by Gollop and Marshall, "A Guide for Aging Duck Broods in the Field." However, even the beat-out method, does not yield complete counts. Therefore, all broods that were known to be on potholes the day prior to the beat-out, but which were not seen during the beat-out itself, were included in the final brood production figure.

The final number of broods per square mile produced in 1955 is also shown in Table I. In 1955, 43.3 broods per square mile were recorded as compared to 30.7 in 1954. There is an increase of 29 percent in the total number of broods produced when compared to the low 1954 figure. However, the number of broods is still not as high as the levels recorded for 1952 and 1953. The "pair efficiency" ratio or pair per brood ratio is 100:59. This compares very favorably with the pair per brood ratio of 100:31 for 1954. Brood sizes were generally larger in 1955.

#### Summary and Outlook

1. Breeding pairs were down 25 percent from 1954.
2. The number of broods produced was 29 percent greater than in 1954 but was not as large as production for 1952 and 1953.
3. The nesting and brood season was at least two to three weeks earlier than the 1954 season. It might be compared phenologically with 1952.

**Table I. - Number of Breeding Pairs and Broods Per Square Mile on the Roseneath Study Area, 1952, 1953, 1954, and 1955.**

<b>Species</b>	<b>Pairs Per Square Mile</b>				<b>Broods Per Square Mile</b>			
	<b>1952</b>	<b>1953</b>	<b>1954</b>	<b>1955</b>	<b>1952</b>	<b>1953</b>	<b>1954</b>	<b>1955</b>
Mallard	36.0	32.7	27.3	22.0	13.3	16.7	6.0	11.3
B-w. Teal	20.7	18.0	23.3	16.0	14.0	15.3	5.3	10.7
Pintail	7.3	4.0	8.0	4.7	2.0	2.0	.7	2.0
Baldpate	8.0	8.7	10.0	8.0	4.0	2.7	.7	2.7
Shoveler	2.7	2.0	3.3	2.0	.7	2.7	1.3	.7
G-w. Teal	3.3	2.0	3.3	-	1.3	.7	.7	-
Canvasback	8.0	6.7	6.7	5.7	5.3	8.0	5.3	6.0
Gadwall	2.0	2.0	1.3	2.0	.7	.7	-	.7
Redhead	2.7	6.7	4.0	3.3	2.7	4.0	4.7	2.0
L. Scaup	.7	1.3	1.5	-	-	.7	-	-
Ruddy Duck	2.7	6.7	9.3	10.0	4.7	6.0	5.3	7.3
Unidentified	-	-	-	-	.7	.7	.7	-
Total	94.1	90.8	97.8	73.7	49.4	60.2	30.7	43.4

Reduction of breeding pairs 1954 to 1955 is 25 percent.

1955 increase in broods over 1954 was 29 percent but still not to levels attained in 1952 and 1953.

## WATERFOWL POPULATION AND PRODUCTION TRENDS ON THE DELTA MARSHES OF SOUTH-CENTRAL MANITOBA - 1955

S. Tenison Dillon

### Introduction

This is a brief report concerning brood production and seasonal trends in waterfowl numbers on a large Manitoba marsh.

### Methods

Before my arrival on the study area in late June, aerial surveys were conducted by Charles Evans, U. S. Fish and Wildlife Service, Peter Ward, Delta Research Station, F. W. Martin, Utah State Agricultural College, and Carl Moran, Portage Flying Club, Portage la Prairie, Manitoba. Mr. Moran was my pilot on all subsequent surveys. The following persons assisted in the collection of brood data by motorboat transects: F. W. Martin, Peter Olson, University of Michigan, and D. F. McKinney, Delta Research Station.

Population and brood data were collected by methods described in "Waterfowl Populations and Breeding Conditions - Summer 1954" - Wildlife No. 27 (page 92). The following changes were made necessary by increased water levels:

(1) The addition of about fifteen square miles of farm land, pasture and newly-formed marsh to the study area bringing the total area covered to approximately 59 square miles. This area was sampled by the addition of two new transects and the extension of existing ones. The sample remained 25 percent with two observers (12-1/2 percent with one).

(2) The rejection of conversion factors applicable to the 1954 motor-boat counts due to changes in shoreline configuration. The calculation of new factors will necessitate the remapping of bay edges.

### Weather and Habitat Conditions

Although spring weather was generally mild (resulting, for the first time in the station's history, in the arrival of all species of waterfowl except the white-winged scoter before April 15), several severe storms in early May and June brought water level fluctuations of a foot or more in 24 to 48 hours. The first of these (May 7) apparently destroyed many early nests in and around the marsh as was evidenced by the flocking of pairs and the late appearance of broods. Over-all water levels as of mid-July were one and one half feet above those of July, 1954. Although water levels decreased somewhat in August, they remained higher than fall levels of a year ago.

These conditions resulted in the destruction of cattail stands already thinned by high waters of 1954. Some stands remained on the eastern half of the marsh where cattail exhibits a vigorous growth habit. Dense phragmites stands were thinned considerably in certain localities by mid-August. Stands of hard-stem bulrush remained relatively unchanged. Extensive areas of new marsh were annexed from the farm land to the south where dense stands of cattail and soft-stemmed bulrush formed the initial succession stage.

I arrived at Delta too late to assess the impact of these changes on the nesting waterfowl but the usefulness of the area to molting ducks was apparently increased. The newly flooded lands and extensive "beaches" of broken and uprooted vegetation provided ideal loafing sites.

#### Population Trends

Table I. gives an estimate of the total waterfowl population of the Delta Marsh on successive aerial surveys in 1955. The totals are broken down into estimates for the area surveyed for the first time in 1955 (Transects 1 and 2) and for the original area before expansion (Transects 3 to 9). The first four surveys do not include the area sampled by Transects 1 and 2. They are subject to further correction as a result of a misunderstanding concerning transect location.

Table I. - Delta Marsh Waterfowl Population Trends - 1955.

Date	Trans. 1 and 2	Trans. 3 - 9	Total Waterfowl
5/31	-	4,920 *	4,920 *
6/20	-	15,552 *	15,552 *
6/25	-	8,040 *	8,040 *
6/29	-	10,584 *	10,584 *
7/5	1,578	11,182	12,760
7/13	1,256	15,112	16,368
7/20	1,936	17,384	19,320
7/26	2,408	25,200	27,608
8/5	4,744	29,616	34,360
8/10	16,168	34,176	50,344
8/17	12,936	38,792	51,728
8/28	20,656	23,616	44,272

\* Subject to correction

These data indicate that by late August almost as many waterfowl occupied the newly flooded 10 square miles of farm land and pasture as did the remaining 49 square miles of marsh. Thus this segment of marsh played an important part in providing loafing sites for the greatly increased numbers of waterfowl using the Delta Marsh during the molting period of 1955, when compared with similar populations of a year ago.

### Production

By mid-July it was obvious that the nesting season on the Delta Marsh would be extended, resulting in a late hatch, particularly among the diving ducks. The results of three brood surveys conducted by motorboat (Table II.) bear this out.

Table II. - Results of Three Delta Marsh Brood Surveys - 1955.

Age Class	7/13-14/55*		7/31/55**		8/20/55***	
	# Broods	Total Yng.	# Broods	Total Yng.	# Broods	Total Yng.
Ia	8	9	5	12	2	13
Ib	1	7	2	12	6	22
Ic	2	14	1	11	3	16
IIa	1	7	-	-	1	2
IIb	1	7	-	-	1	9
IIc	2	26	-	-	3	10
III	2	19	5	35	2	12
?	1	5	1	2	2	12
Seen off Trans.					1	2
Total	10	85	14	82	21	98

\* 8 dabbling and 2 diving duck broods.

\*\* 6 dabbling and 6 diving duck broods (2 broods unidentified).

\*\*\* 3 dabbling and 18 diving duck broods.

These data are not directly comparable one with another since the first survey involved 15 transects; the second, 10; and the third, 14. They do indicate, however, the extended nesting season with a late hatch of diving ducks.

A total production estimate for the marsh must await the calculation of appropriate conversion factors but I am reasonably certain that it exceeded that of 1954. Aerial surveys provided an estimate of 104 broods on the marsh as of August 17. This is somewhat higher than my best aerial estimate of 1954 (80 broods on August 16).

Summary

Waterfowl population and production studies were continued in 1955 over 59 square miles of prairie marsh in south-central Manitoba.

Water level increases of one and one half feet over the fall of 1954 resulted in the extension of the marsh southward and vegetational changes that increased the usefulness of the marsh to molting waterfowl.

Concentrations of pintail, baldpate and mallard were apparently responsible for the increased post-breeding populations of 1955 when compared with those of 1953 and 1954.

An extended nesting season and late hatch (particularly among the diving ducks) provided a final production figure that was apparently somewhat higher than that of 1954.

**WATERFOWL BREEDING GROUND SURVEYS OF DUCKS UNLIMITED (CANADA)**  
**IN ALBERTA, SASKATCHEWAN AND MANITOBA**

William G. Leitch

Introduction

This report covers the ground transects run by Ducks Unlimited field men in the three prairie provinces and gives results obtained on special study areas.

Transects were run the third week of May to record breeding pairs and again mid-July for information on water conditions.

To conserve space species break-downs are given only on a provincial level but are available for all smaller units.

Areas for more intensive study are located at Strathmore and Brooks in Alberta and at the Caron Potholes and Southeby in Saskatchewan. The Alberta areas are a cooperative project with the U. S. Fish and Wildlife Service while those in Saskatchewan are a Ducks Unlimited responsibility.

Data obtained from Keeman Cooperators and the annual aerial survey have been published in the Duckological which is issued monthly while the waterfowl are in Canada.

Results of Transects

Alberta

Area - Calgary South (Western "Short Grass" Prairies)

(Via: Strathmore, Mossleigh, Macleod, Pincher Creek, Waterton, Cardston, Macleod, Kepp, Vulcan, Milo, Grants, Hussar.)

	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>
Size of Sample - Square Miles	43	40	43	43	43
Breeding Prs. / Sq. Mi. - May	15.2	22.4	40.6	32.9	28.9
Ponds Per Square Mile - May	4.9	6.6	7.3	9.1	7.0
No. of Water Areas/Sq. Mi. on July 15 Estimated to Last All Season	3.3	2.7	6.5	2.9	3.9

Area - Calgary North (Western "Short Grass" Prairies, from  
Endiang Aspen Parkland)  
(Via: Hussar, Morrin Watt, Endiang, Ranching, Big Balley,  
Stettler, Delburne, Innisfail, Olds, Sundre, Radnor, Calgary.)

	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>
Size of Sample - Square Miles	40	39	40	40	39
Breeding Prs. /Sq. Mi. - May	15.1	20.4	28.6	41.3	34.2
No. of Water Area/Sq. Mi. -May	7.8	10.8	12	21.6	16.6
No. of Water Areas/Sq. Mi. on July 15 Estimated to Last All Season	6.1	3.5	9.7	9.1	8.1

Area - Tilley South (Eastern "Short Grass" Prairies)  
(Via: Brooks, Taber, Lethbridge, Del Bonita, Pakowki,  
Seven Persons, Medicine Hat, Tilley.)

	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>
Size of Sample - Square Miles	36	36	38	38	25
Breeding Prs. /Sq. Mi. - May	11.9	18	25.1	28.1	45.4
No. of Water Areas/Sq. Mi. -May	3.6	7.4	7.8	4.3	5.2
No. of Water Areas/Sq. Mi. on July 15 Estimated to Last All Season	2.5	2.6	2.7	1.1	2.0

Area - Tilley Northeast (Eastern "Short Grass" Prairies)  
(Via: Suffield, Jenner, Empress, Cereal, and Hanna to Tilley.)

	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>
Size of Sample - Square Miles	38	35	37	37	35
Breeding Prs. /Sq. Mi. - May	33.1	30.6	29.9	30.7	31.9
No. of Water Areas/Sq. Mi. -May	4.9	9.5	10.0	5.9	7.1
No. of Water Areas/Sq. Mi. on July 15 Estimated to Last All Season	3.7	4.0	4.0	2.3	2.1

Area - Hanna Northeast (Aspen Parklands)  
(Via: Cereal, Consort, Czar, Killam, Hanna.)

	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>
Size of Sample - Square Miles	29	26	28	28	28
Breeding Prs. /Sq. Mi. - May	42.9	22.1	26.7	23.8	31.2
No. of Water Areas/Sq. Mi. -May	7.7	13.0	16.4	8.2	9.2
No. of Water Areas/Sq. Mi. on July 15 Estimated to Last All Season	6.3	7.4	9.4	4.4	3.6

Area - Tofield Southeast (Aspen Parklands)

(Via: Tofield, Wainwright, Vermilion, Two Hills, Ranfurly, Hilliard, Tofield.)

	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>
Size of Sample - Square Miles	34	34	37	36	36
Breeding Prs./Sq. Mi. - May	5.9	8.2	12.6	12.1	19.8
No. of Water Areas/Sq. Mi. -May	-		9.8	10.9	9.8
No. of Water Areas/Sq. Mi. on July 15 Estimated to Last All Season	-	-	4.7	5.1	4.9

Area - Tofield Southwest (Aspen Parklands)

(Via: Tofield, Camrose, Bashaw, Ponoka, Thorsby, Leduc, New Serepta.)

	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>
Size of Sample - Square Miles	27	27	26	29	27
Breeding Prs./Sq. Mi. - May	3.0	4.5	11.1	14.5	10.2
No. of Water Areas/Sq. Mi. -May	-		15.6	10.8	6.2
No. of Water Areas/Sq. Mi. on July 15 Estimated to Last All Season	-	-	8.3	7.9	3.4

Area - Tofield North (Aspen Forest)

(Via: Mundare, Willingdon, Kaleland, Lafond, Ashmont, Vimy, Edmonton.)

	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>
Size of Sample - Square Miles	26	24	25	24	26
Breeding Prs./Sq. Mi.	3.3	5	9.9	7.0	9.5
No. of Water Areas/Sq. Mi.-May	-		11.3	7.6	6.8
No. of Water Areas/Sq. Mi. on July 15 Estimated to Last All Season	-	-	2.6	3.2	2.2

<u>Summary</u>	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>
Total Provincial Sample-Sq. Mi.	273	261	274	275	259
Breeding Prs./Sq. Mi.	16.4	17.3	24.5	25.3	26.7
Water Areas/Sq. Mi. - May			10.9	10.0	8.8
Water Areas/Sq. Mi. on July 15 Estimated to Last All Season			5.9	4.4	3.8

## ALBERTA

Species Composition

<u>Species</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955*</u>
Pintail	1989	2586	2125	2464
Mallard	1014	1712	1653	1689
Blue-winged Teal	355	544	995	765
Shoveler	357	510	722	535
Lesser Scaup	291	449	564	798
Baldpate	249	368	368	428
Gadwall	96	99	176	187
Redhead	68	138	146	165
Canvasback	35	154	78	130
Green-winged Teal	42	60	58	98
Ruddy Duck	13	53	48	55
Bufflehead	1	9	11	13
Goldeneye	-	3	1	4
Cinnamon Teal	1	1	1	2
White-winged Scoter	2	-	-	3
Ringneck	1	-	-	-
Wood Duck	-	-	1	-
Unidentified	5	20	30	18
Total	4519	6715	6988	7354

\* Due to unpassable roads 13 transects in the southeastern part of the Province were not run; hence the 1955 data are not completely comparable with those of previous years.

The over-all Alberta breeding population remained practically unchanged from 1954 on the basis of the transects completed. Had the 13 transects in the Tilley South area been completed the increase indicated for pintails might have reached significant proportions. No spectacular shifts appear to have taken place though a reduction from the abnormal number of birds in the Calgary North area in 1954 occurred, while abundant water south of the Old Man River in the Tilley South area led to a considerable increase there. Increases in the Aspen Parklands in both the Hanna Northeast and the Tofield Southeast areas were also recorded.

The July 15 transects showed a small reduction in the amount of water on that date from that of the previous year. This was not serious except in the immediate Tilley-Suffield-Jenner area where some drought loss probably occurred.

Saskatchewan

Area - Swift Current Southwest (Eastern "Short Grass" Prairies)  
(Bounded on the north by No. 1 Highway, east by No. 4 Highway,  
and on the south and west by the U. S. and Alberta borders.)

	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>
Size of Sample - Square Miles	14	14	14	14	14
Breeding Prs. /Sq. Mi. - May	8.1	27.5	33.9	38.0	44.4
No. of Water Areas/Sq. Mi. -May	11.1	9.5	10.5	9.1	11.0
No. of Water Areas/Sq. Mi. on July 15 Estimated to Last All Season		2.4	5.8	3.6	4.5
					5.3

Area - Swift Current North to South Saskatchewan River (Western  
Section - Mixed Prairie) (Bounded south by No. 1 Highway, east  
by No. 4 Highway, west by Alberta border, and north by the  
South Saskatchewan River.)

	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>
Size of Sample - Square Miles	20	20	20	20	20
Breeding Prs. /Sq. Mi. - May	17	43.4	57.7	41.6	38.0
No. of Water Areas/Sq. Mi. -May	15.3	11.2	10.1	5.1	10.3
No. of Water Areas/Sq. Mi. on July 15 Estimated to Last All Season		4.7	4.4	4.1	2.8
					5.2

Area - North of South Saskatchewan River West of Highway No. 4  
(Western Section - Mixed Prairie) (Bounded by the South Saskatchewan  
River on the south, on the north by Township 34, on the east by  
Highway No. 4, and on the west by the Alberta border.)

	<u>1951</u>	<u>1952</u>	<u>to '52</u>	<u>'53 Comp.</u>	<u>'53 New</u>	<u>Transects</u>	<u>1954</u>	<u>1955</u>
Size of Sample - Square Miles	16	16	15	32	32		32	33
No. of Breeding Prs. /Sq. Mile - May		13.5	36	64.2	52.0	36.8	32.8	
No. of Water Areas/Sq. Mi. -May	15.1	15.6	13.4	13.4	4.2	4.2	14.1	
No. of Water Areas/Sq. Mi. on July 15 Estimated to Last All Season		5.2	5.4	4.3	6.0	1.7	3.7	

Area - North of No. 1 Highway, East of Highway No. 4  
(Swift Current Area) (Western Section - Mixed Prairies)

(Bounded by No. 1 Highway on the south, No. 4 on the west, on the north by Township 34, and on the east by Range 1, west of 3rd.)

	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>
Size of Sample - Square Miles	25	23	25	25	25
No. of Breeding Prs./Sq. Mi. -					
May	11.2	39.3	55.5	34.5	38.8
No. of Water Areas Per Square Mile - May	14.5	15.6	14.5	7.1	18.6
No. of Water Areas/Sq. Mile on July 15 Estimated to Last					
All Season	5.7	4.8	5.2	4.5	7.7

Area - Swift Current East (Western Section - Mixed Prairie)  
(Bounded by Highway No. 1 on the north, on the west by No. 4 Highway, on the east by Range 1, west of 3rd, and on the south by the U. S. Border.)

	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>
Size of Sample - Square Miles	11	11	11	11	11
Breeding Prs./Sq. Mi. - May	11.2	38.7	41.4	41.7	37.0
No. of Water Areas/Sq. Mi. - May	11.7	14.9	12.8	8.5	17.8
No. of Water Areas/Sq. Mi. on July 15 Estimated to Last					
All Season	5.1	4.6	6.6	5.2	9.1

Area - Wynyard Southwest. Brown Soils (Western Section - Mixed Prairie) (Missouri Couteau, Moose Jaw to Ogema via Highways 2 and 13.)

	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>
Size of Sample - Square Miles	Not	10	10	10	10
Breeding Prs./Sq. Mi. -	Comparable	49.2	61.8	55.6	45.6
May	with				
No. of Water Areas/Sq. Mi. - Subsequent					
May	years	19.7	10.0	8.6	18.9
No. of Water Areas/Sq. Mi.					
on July 15 Estimated to					
Last All Season		6.5	8.8	7.3	8.2

Area - Wynyard Southwest. Dark Brown Soils (Eastern Section of Mixed Prairie.)

(Bounded on the south by U. S. Border, on the west by the Moose Jaw-Radville Railroad and Highway No. 11 Moose Jaw to Saskatoon, on the east by Highways Nos. 9 and 16 to Regina and No. 6 from Regina north to No. 14, and on the north by Highway No. 14.)

		<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>
Size of Sample - Square Miles	Not	30	30	30	11	
Breeding Prs. /Square Mile - May	Comparable with	18.1	17.4	16.4	18.5	
No. of Water Areas/Sq. Mile - May	Subsequent	14.8	13.1	8.2	13.5	
No. of Water Areas/Sq. Mi. on July 15 Estimated to Last years						
All Season		5.3	7.2	6.1	6.4	

Area - Wynyard Southeast. Black Soils. (Aspen Parkland.)

(Bounded on the south by the U. S. Border, on the west by Highways Nos. 9 and 16 to Regina and by No. 6 north to junction with No. 14, on the east by the Manitoba Border to Kamsack, on the north by Highway No. 5 Kamsack to Watson.)

		<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>
Size of Sample - Square Miles	Not	25	25	25	4	
Breeding Prs. /Sq. Mi. -May	Comparable	10.2	10.8	14.8	9.2	
No. of Water Areas per Square Mile - May	with	16.1	19.7	17.0	20.0	
No. of Water Areas/Sq. Mi. on July 15 Estimated to Last All Season	years	6.2	10.4	19.8	13.7	

Area - Wynyard North. Degraded Black and Grey Soils. (Mixed Aspen and Coniferous Forest.)

(Via: Highways Nos. 2 and 55 Prince Albert to White Fox - south to Wadena via Highway No. 35.)

		<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>
Size of Sample - Square Miles	Not	10	10	10	0	
Breeding Prs. /Sq. Mi. -May	Comparable	4.0	3.7	5.1	-	
No. of Water Areas/Sq. Mi.	with	5.7	5.5	6.3	-	
No. of Water Areas/Sq. Mi. on July 15 Estimated to Last All Season	Subsequent years	4.0	5.3	5.3	4.0	

<u>Summary</u>	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>
Total Provincial Sample - Sq. Mi.	161	177	177	177	143*
Breeding Prs. Per Sq. Mi.	22.0	37.2	30.1	31.9	
Water Areas Per Square Mile - May	21.3	12.9	8.2	14.4	
Water Areas Per Square Mile on July 15 Estimated to Last All Season	5.2	6.4	6.9	7.6	

\* Not comparable since so few transects completed in eastern Saskatchewan.

### SASKATCHEWAN

#### Species Composition

<u>Species</u>		<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>
Pintail	Not Comparable	2242	1521	Impassible	
Mallard	with	1796	1659	roads in	
Blue-winged Teal	Subsequent	671	611	eastern	
Shoveler	years	634	490	Saskatchewan	
Baldpate		455	312	prevented	
Gadwall		205	269	completion	
Lesser Scaup		193	207	of transects.	
Canvasback		153	106	Data are not	
Redhead		103	77	comparable.	
Green-winged Teal		84	52		
Ruddy Duck		46	29		
Unidentified		-	2		
 Total		6582	5335		

The transects for western Saskatchewan show little change in the breeding population in size of species composition from 1954. Except for Wynyard Southwest, too few transects were run in eastern Saskatchewan to be significant. Although Wynyard Southwest showed a significant decline, the remainder of the east side of the Province was estimated to have as many breeding pairs as the previous year, and possibly more.

It was possible to re-run all transects on July 15 and the results show water conditions to have been even better than in July, 1954, which was also an exceptionally good year.

Manitoba.

Transects were run in the west half of the Province between the International boundary and Township 26 between May 11 and 20 to assess the return of breeding ducks. The results are given below:

	<u>1953</u>	<u>1954</u>	<u>1955</u>
Size of Sample - Sq. Mi.	50	50	57
Breeding Pairs Per Sq. Mi.	24.5	32.8	20.1
Water Areas Per Sq. Mi. -May	4.3	6.2	-

Species Breakdown

<u>Species</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>
Mallard	429	548	341
Pintail	137	173	116
Gadwall	21	32	29
Baldpate	78	81	40
Shoveler	64	38	41
Blue-winged Teal	210	242	224
Green-winged Teal	46	47	17
Canvasback	94	167	115
Redhead	42	91	37
Lesser Scaup	75	161	118
Ringneck	12	12	14
Ruddy Duck	17	38	52
Bufflehead	2	11	2
American Goldeneye	0	2	0
<b>Total Pairs</b>	<b>1227</b>	<b>1643</b>	<b>1146</b>

The transects show a decrease of 30 percent in the breeding pair count. This decrease extends to all species except shovelers, ringnecks, and ruddies, which show slight increases.

### BROOKS AREA - ALBERTA

(Area 1 of the U. S. Fish and Wildlife Service)

Fred Sharp

This study area, a cooperative undertaking by Ducks Unlimited and the U. S. Fish and Wildlife Service, extends along one side of the old No. 1 Highway from the town of Brooks to Suffield and totals 4.8 square miles.

Counts of breeding pairs were made in early spring but the area was soon dry except for irrigation water.

A full report by Allen G. Smith is available elsewhere in this publication under "Waterfowl Breeding Ground Surveys of Special Study Areas."

### STRATHMORE AREA - ALBERTA

(Area 2 of the U. S. Fish and Wildlife Service)

George Freeman

Weekly runs of this 26-mile transect were made in spring and early summer by George Freeman of Ducks Unlimited. Nest searches were also made and brood counts at the end of June and July.

The results of this work and that of the U. S. Fish and Wildlife Service in the area are fully reported by Allen G. Smith under the section "Waterfowl Breeding Ground Surveys of Special Study Areas" in this publication.

### CARON POTHOLE STUDY AREA - SASKATCHEWAN

W. G. Leitch

The study area is fully described in the Special Scientific Report No. 25 "Waterfowl Populations and Breeding Conditions - Summer 1953."

Heavy snowfall, a quick thaw and run-off followed by a two-inch rain in early May resulted in the highest water levels since our work in the area began and in the memory of the oldest inhabitants.

The results of the breeding pair count made May 18 and 19 are given in Table I. Although made five days earlier than in previous years, the results should be comparable as phenologically 1955 was considerably ahead of 1954 at this date.

**Table I. - Breeding Population - Caron Potholes.**

<b>Species</b>	<b>1950</b>	<b>1951</b>	<b>1952</b>	<b>1953</b>	<b>1954</b>	<b>1955</b>
Blue-winged Teal	75	90	143	154	114	149
Pintail	35	57	79	71	79	86
Shoveler	42	52	34	39	63	29
Mallard	31	34	111	154	193	106
Gadwall	18	33	40	53	62	42
Baldpate	28	24	26	39	52	53
Redhead	2	10	23	24	6	13
Lesser Scaup	7	8	9	22	16	66
Green-winged Teal	1	5	14	9	7	10
Canvasback	-	4	5	16	4	6
Ruddy Duck	1	4	6	6	-	1
Cinnamon Teal	-	-	-	-	1	-
Unidentified	-	-	-	4	11	5
<b>Total Pairs</b>	<b>240</b>	<b>321</b>	<b>490</b>	<b>591</b>	<b>608</b>	<b>566</b>
<b>Per Square Mile</b>	<b>56.3</b>	<b>75.5</b>	<b>115.3</b>	<b>139.0</b>	<b>143.0</b>	<b>133.1</b>

The data show a considerable reduction in mallards from the previous year and an increase in blue-winged teal. Decreases also took place in gadwall and shoveler. The large increase in scaup was apparently due to the inadvertent inclusion of migrants since the brood counts do not confirm that so many scaup remained to nest, unless they were subjected to nest predation well above normal, which is not supported by the blue-winged teal data.

During the breeding pair count the number of lone mallard and pintail drakes was abnormally low. The data showed the mallard breeding population to be composed of 46 percent lone drakes and the pintail population 64 percent. In 1954 these percentages were 67 and 80 percent; in 1953, 58 and 77 percent, and in 1952 (the last big duck crop), 76 and 86 percent. The June brood count confirmed that early nesting attempts, in spite of an early season, had been largely unsuccessful when only 12 broods were counted, including four mallard and five pintail. The June brood count in 1954 located 38 broods; in 1953, 53; and in 1952, 99. In view of the lack of evidence of abnormal losses from other sources, it would appear that in this particular area the two-inch rain of early May and subsequent snow may have been more damaging to early nests than was at first believed and may have been peculiar to knob and kettle topography, since early nesting success seems to have been normal or better elsewhere.

Brood counts using the "beat out" method were carried out June 20 and 22 and August 24 and 25, the results of which are given in Table II.

Table II. - Brood Production - Caron Potholes.

Species	1950	1951	1952	1953	1954	1955
Blue-winged Teal	12	39	74	108	84	140
Pintail	5	28	35	37	28	29
Shoveler	11	19	13	32	26	16
Mallard	13	10	58	53	47	22
Gadwall	8	11	12	14	24	23
Baldpate	13	12	17	19	17	27
Redhead	2	2	5	7	-	2
Lesser Scaup	3	7	14	24	12	6
Green-winged Teal	1	2	7	-	3	1
Canvasback	-	1	3	3	4	5
Ruddy Duck	1	4	-	3	1	-
Unidentified	21	15*	31*	12*	7	3
Total	90	150	269	312	253	274
Per Square Mile	21.1	35.3	63.3	73.4	59.5	64.4

\* Rafted broods on larger waters without females. Total count taken and converted into broods by dividing by six.

Forty-eight percent of the breeding pairs are estimated to have produced broods. This is about average when compared with 41 percent in 1954, 52 percent in 1953, and 54 percent in 1952. Mallard production was again poor at 20 percent and pintail slightly better at 33 percent. Figures for 1954 were 24 and 35 percent and for 1953, 34 and 52. It should be pointed out however, that broods of these species are much more difficult to see and, while the percentages given may be comparable from year to year, they cannot be construed as the total production from the May population.

The blue-winged teal again had an exceptional season producing 140 broods from an estimated 149 breeding pairs. Undoubtedly more breeding pairs must have moved into the area after the May breeding pair count for a nesting success of 93 percent is most improbable.

#### SOUTHEY AREA - SASKATCHEWAN

R. T. Sterling

At freeze-up in 1954 all the ponds in the two square mile study area contained sufficient depth to insure good water conditions for the 1955 waterfowl breeding season. A substantial spring run-off coupled with above normal rainfall

in April through May and early June resulted in most of the ponds being above the high levels of 1954. Some had reached their outlet levels and were thus stabilized but others flooded their treed borders to depths of two feet and can still go higher. There has been some loss of water during mid-summer but there will be a good carry-over for the 1956 breeding season.

A breeding pair count was conducted on May 17. Some of the pintail and mallard were already incubating and thus some may have been missed.

Brood counts were conducted on June 30 and August 10.

There was almost no change in the total breeding population between 1954-1955. Nesting success increased from 51 percent to 61 percent. This increase in nesting success was mainly due to the increase in success of the mallard. Fine weather during the fall of 1954 allowed most of the harvested fields to be cultivated before freeze-up and this, coupled with adverse weather conditions in the spring, prevented early cultivation of stubble fields and resulted in very few nests being lost to cultivation.

#### Breeding Population and Production - Southeby Study Area, 1952 to 1955.

Species	Pairs				Broods			
	1952	1953	1954	1955	1952	1953	1954	1955
Mallard	13	19	27	23	5	9	13	17
B-w. Teal	7	11	13	18	1	5	6	8
Pintail	6	10	13	15	2	4	7	11
Gadwall	1	3	1	-	1	-	1	-
Baldpate	3	3	5	2	2	3	2	2
Shoveler	2	3	2	2	1	3	2	1
G-w. Teal	2	-	1	2	2	1	1	-
L. Scaup	2	2	3	5	-	-	2	2
Canvasback	1	-	2	1	-	1	1	1
Redhead	1	-	-	2	-	-	-	1
Ruddy	1	-	2	2	-	1	-	1
Total	39	51	69	72	14	27	35	44
Per Square Mile	19.5	25.5	34.5	36	7	13.5	17.5	22

COOPERATIVE WATERFOWL BREEDING GROUND SURVEY IN  
ONTARIO, NORTHERN MANITOBA, AND NORTHERN SASKATCHEWAN

1955

Edward G. Wellein

Introduction

This report covers the aerial survey work accomplished during the summer of 1955 in the Provinces of Ontario, Northern Manitoba, and Northern Saskatchewan. The habitat involved in this survey is, generally speaking, of a low waterfowl breeding population density when compared to the prairie pothole region. This habitat is so extensive, however, that in the aggregate it contributes very materially to the total continental waterfowl population, and therefore, must be considered in the evaluation of the population and the success thereof. To expedite and organize the survey work the habitat has been divided into strata or sampling zones. Stratum C is described as the closed forest zone and extends over the three Provinces involved. Stratum D is, specifically, the Saskatchewan River delta, which is located both in Manitoba and Saskatchewan River delta, which is located both in Manitoba and Saskatchewan. Stratum E is the open forest tundra zone, which also extends through all three Provinces. The sampling intensity and location of the transect were reorganized this year on the basis of variability test, and therefore differ somewhat from 1954.

The primary objective of the survey this year, as in the past, was the collection of quantitative data on waterfowl breeding populations during May for use by the Waterfowl Regulations Committees of Canada and the United States in determining waterfowl regulations. Another objective was to attempt to measure the success of the breeding population by conducting an aerial brood survey during the month of July. Consequently, the survey work was divided into two parts--the breeding pair survey, which was conducted during July.

The May survey of breeding pairs was started May 8 and completed on May 28. One survey crew of Messrs. Wellein and Newcomb worked northern Saskatchewan, northern Manitoba, and Ontario as far east as Kapuskasing. A second crew, Messrs. Glover and Hansen, in Grumman Widgeon N-744, covered eastern Ontario (380 square miles of transect). Although the sampling pattern was reorganized this year it was quite similar to that of 1954. However, the survey area was worked from west to east instead of east to west as in 1954. This procedure was found to be far more satisfactory from an operational standpoint. As a result of Ontario being worked last, less difficulty was experienced with wet unserviceable airfields, and, as usual, the country opened up earlier on the western side of the survey area.

The July survey was begun July 4 and completed on July 25. Two aircraft were also used on this portion of the survey. The Widgeon, manned by Ross Hansen and Al Noltemeier, accounted for a coverage of 130.5 square miles

of transect east of Kapuskasing. The Goose covered the remainder of Ontario, northern Manitoba, and northern Saskatchewan, accounting for 1,678.5 square miles. This does not include a transect run northward from Churchill to Eskimo Point and return.

#### Methods Used and Areas Covered

A standard one-quarter mile transect was used in both the May and July portion of the survey. This is double the width of the transect used during the July survey by the prairie crews. It is felt that in the northern areas nothing can be gained in accuracy by reducing the width of the transect to one-eighth mile, and by using the wider transect twice as much coverage is accomplished. During both parts of the survey waterfowl were recorded by species, and when possible, separated into pairs and lone drakes. An attempt was made to record broods by species, age, class, and number per brood.

A breakdown of the aerial coverage accomplished this summer is shown in Table I.

Table I. - Aerial Coverage Accomplished - Summer, 1955.

Province	Strata Description	Area Sq. Mi.	<u>May Breeding Pair Survey</u>		Coverage
			No. 18	Mi. Seg.	
Ontario	Closed Forest (C)	325,940	211	3798	949.5*
Manitoba	Closed Forest (C)	67,360	56	1008	252.0
Manitoba	Sask. River Delta (D)	3,960	12	216	54.0
Saskatchewan					
	S of 55°30' Closed Forest	40,990	64	1152	288.0
Saskatchewan					
	N of 55°30' Closed Forest	111,070	41	738	184.5
<b>Total</b>		<b>549,320</b>	<b>384</b>	<b>6912</b>	<b>1728.0</b>

\* 380 square miles by Grumman Widgeon.

#### July Production Survey

Ontario	Closed Forest (C)	325,940	200	3600	900.0*
Manitoba	Closed Forest (C)	67,360	85	1530	382.5
Manitoba	Sask. River Delta(D)	3,960	12	216	54.0
Saskatchewan					
	S of 55°30' Closed Forest (C)	40,990	64	1152	288.0
Saskatchewan					
	N of 55°30' Closed Forest (C)	111,070	41	738	184.5
<b>Total</b>		<b>549,320</b>	<b>402</b>	<b>7236</b>	<b>1809.0</b>

\* 130.5 square miles by Grumman Widgeon

The coverage accomplished this year is the largest and best distributed of any since the surveys were commenced. The surveys in Northern Ontario were made possible by gasoline being made available at Kanuchuan Rapids, Gods Lake, Trout Lake, and other points, by Ontario Central Airlines.

#### Weather and Water Conditions

Break up in the north country was ahead of normal this year and far ahead of the 1954 break up. Ducks moved into the area early in the season and were not held back by ice. For example, Gaddam Bay, and Lake Manitoba did not open until May 17, 1954, but this year were open before May 1. Lake Atikameg near The Pas, Manitoba, was ice covered June 1, 1954, but was open this year on May 12. Contrary to the usual course of events, the nesting ducks were not exposed to a single blizzard during the month of May, and although the month of June was rather wet on the east side of the area, no severe weather prevailed.

Table II. - Duck Species Index - Stratum C, Ontario, 1954-1955.

Species	Species Composition		Species Index			'Two-Yr. Average'	Change Percent	
	1954	1955	1954	1955	From 1954		From Average	
Mallard	14.3	6.7	62,410	28,151	45,280	- 54.9	-	37.8
Black Duck	21.1	17.7	92,088	74,839	83,464	- 18.7	-	10.3
Gadwall	-	-	-	-	-	-	-	-
Baldpate	1.4	1.4	6,110	6,719	6,414	+ 10.0	+	4.7
Pintail	1.1	.2	4,801	747	2,774	- 84.4	-	73.0
G-w. Teal	.8	-	3,491	-	1,745	-	-	-
B-w. Teal	-	-	-	-	-	-	-	-
Shoveler	-	-	-	-	-	-	-	-
Merganser	33.1	42.5	144,460	120,949	132,704	- 16.3	-	8.8
Redhead	-	-	-	-	-	-	-	-
Ringneck	5.0	5.6	21,822	25,384	23,603	+ 16.3	+	7.5
Canvasback	-	-	-	-	-	-	-	-
L. Scaup	12.0	14.6	52,372	67,194	59,783	+ 28.3	+	12.4
Goldeneye	10.3	4.8	44,953	20,158	32,555	- 55.1	-	38.1
Ruddy Duck	-	-	-	-	-	-	-	-
Bufflehead	.2	1.2	873	5,973	3,423	+584.2	+	74.5
Scoter	.5	5.1	2,182	23,145	12,663	+960.7	+	82.8
Total Ducks			435,562	373,259	404,410	- 14.3	-	7.7
C. Goose			26,450	16,478	21,464	- 38.0	-	23.2

**Table III. - Duck Species Index - Stratum C, Manitoba, 1954-1955.**

Species	Species Composition		Species Index		2-Year Average	Change Percent	
	1954	1955	1954	1955		From 1954	From Average
Mallard	32.4	28.9	66,832	53,460	60,146	- 20.0	- 11.1
Black Duck	.3	-	618	-	309	-	-
Gadwall	-	-	-	-	-	-	-
Baldpate	5.5	3.5	11,345	6,415	8,880	- 43.4	- 27.7
Pintail	.8	-	1,650	-	-	-	-
G-w. Teal	-	1.0	-	2,138	825	-	+ 61.4
B-w. Teal	-	-	-	-	-	-	-
Shoveler	-	-	-	-	-	-	-
Merganser	28.3	36.7	58,374	67,884	63,129	+ 16.3	+ 7.0
Redhead	-	1.8	-	3,208	1,604	-	+ 50.0
Ringneck	2.7	2.1	5,569	3,742	4,655	- 32.8	- 19.6
Canvasback	-	-	-	-	-	-	-
L. Scaup	24.1	19.1	49,711	35,284	42,497	- 29.0	- 16.9
Goldeneye	1.0	2.1	2,063	3,742	2,902	+ 81.4	- 28.9
Ruddy Duck	-	-	-	-	-	-	-
Bufflehead	1.1	3.8	2,269	6,950	4,609	+206.3	+ 50.8
Scoter	3.8	1.0	7,838	1,604	4,721	- 79.5	- 66.0
Total Ducks			206,269	184,427	195,353	- 10.6	- 5.6
C. Goose			986	3,742	2,364	+279.5	+ 58.3

**Table IV. - Duck Species Index, Stratum D, Manitoba - Saskatchewan River Delta,  
1954 - 1955.**

Species	Species Composition		Species Index		2-Year Average	Change	%
	1954	1955	1954	1955		From 1954	From Aver.
Mallard	22.8	12.2	16,883	23,895	20,389	+ 41.5	+ 17.2
Black Duck	-	-	-	-	-	-	-
Gadwall	-	.4	-	880	-	-	-
Baldpate	3.6	4.1	2,666	8,063	5,364	+202.4	+ 50.3
Pintail	8.3	19.3	3,925	37,823	20,874	+896.2	+ 81.2
G-w. Teal	Tr.	.9	-	1,759	-	-	-
B-w. Teal	2.0	1.4	1,481	2,785	2,133	+ 88.0	+ 30.6
Shoveler	1.6	.3	1,185	439	812	- 62.9	- 31.5
Merganser	1.4	4.0	1,036	7,916	4,476	+664.1	+ 76.8
Redhead	3.4	2.8	2,518	5,424	3,971	+115.4	+ 36.6
Ringneck	3.6	2.7	2,666	5,278	3,972	+ 98.0	+ 32.9
Canvasback	7.1	5.6	5,257	10,995	8,126	+109.1	+ 35.3
L. Scaup	44.5	44.3	32,952	86,787	59,869	+163.4	+ 45.0
Goldeneye	.8	.7	592	1,319	955	+122.8	+ 38.1
Ruddy Duck	.3	-	222	-	-	-	-
Bufflehead	.3	.6	222	1,173	697	+428.3	+ 68.3
Scoter	3.3	.7	2,444	1,466	1,955	- 40.0	- 25.0
Total Ducks			74,049	196,002	135,025	+164.7	+ 45.1
C. Goose			162	84	123	- 48.1	- 31.7

**Table V. - Total Species Index - Northern Manitoba (Strata C and D), 1954-1955.**

Species	Species Composition		Species Index		2-Year Average	Change Percent	
	1954	1955	1954	1955		From 1954	From Average
Mallard	29.9	20.3	83,715	77,355	80,532	- 7.6	- 3.9
Black Duck	.2	-	618	-	309	-	-
Gadwall	-	.2	-	880	440	-	+100.0
Baldpate	5.0	3.8	14,011	14,478	14,244	+ 3.3	+ 1.6
Pintail	2.0	9.9	5,575	37,823	21,699	+578.4	+ 74.3
G-w. Teal	-	1.1	-	3,897	1,948	-	+100.0
B-w. Teal	.5	.7	1,481	2,785	2,133	+ 88.0	+ 30.5
Shoveler	.4	.1	1,185	439	812	- 62.9	- 45.9
Merganser	21.2	19.9	59,410	75,800	67,605	+ 27.6	+ 12.1
Redhead	.9	2.3	2,518	8,632	5,575	+242.8	+ 54.8
Ringneck	2.9	2.4	8,235	9,020	8,627	+ 9.5	+ 4.5
Canvasback	1.8	2.9	5,257	10,995	8,126	+109.1	+ 35.3
L. Scaup	29.8	32.1	82,663	122,071	102,367	+ 47.7	+ 19.5
Goldeneye	.9	1.3	2,655	5,061	3,858	+ 90.6	+ 31.1
Ruddy Duck	Tr.	-	222	-	111	-	-
Bufflehead	.8	2.2	2,491	8,123	5,307	+226.1	+ 53.0
Scoter	3.7	.8	10,282	3,070	6,676	- 70.1	- 54.0
Total Ducks			280,318	380,429	330,373	+ 35.7	+ 15.1
C. Goose			1,148	3,826	2,987		

Table VI. - Total Species Index - Northern Saskatchewan, 1954-1955.

Species	Species Composition		Species Index		2-Year Average	Change From 1954	Percent From Average
	1954	1955	1954	1955			
Mallard	28.0	21.8	109,405	143,587	126,496	+ 31.2	+ 13.5
Black Duck	-	-	-	-	-	-	-
Gadwall	-	Tr.	-	285	142	-	+100.7
Baldpate	1.4	1.7	5,470	11,362	8,416	+107.7	+ 35.0
Pintail	3.0	1.3	11,723	8,538	10,130	- 27.2	- 15.7
G-w. Teal	.6	1.4	2,344	9,589	5,966	+309.1	+ 60.7
B-w. Teal	1.8	.2	7,033	1,423	4,228	- 79.8	- 66.3
Shoveler	.5	.1	1,953	569	1,261	- 70.9	- 54.9
Merganser	10.3	17.2	40,245	113,091	76,668	+181.0	+ 47.5
Redhead	1.3	.3	5,079	1,708	3,393	- 66.4	- 49.7
Ringneck	2.5	6.9	9,768	45,774	26,473	+368.6	+ 72.9
Canvasback	3.3	1.6	12,894	10,530	11,712	- 18.3	- 10.1
L. Scaup	33.5	38.1	130,895	251,797	191,346	+ 92.4	+ 31.6
Goldeneye	.2	1.9	781	12,566	6,673	+1508.9	+ 88.3
Ruddy Duck	.7	-	2,735	-	1,367	-	-
Bufflehead	5.1	3.8	19,927	24,954	22,440	+ 25.2	+ 11.2
Scoter	7.8	3.5	30,477	22,876	26,676	- 24.9	- 14.2
Total Ducks			390,729	658,649	524,689	+ 68.6	+ 25.5
C. Goose			819	3,262	2,040	+298.2	+ 59.9

**Table VII. - Total Species Index - Entire Area Surveyed, 1954-1955.**

Species	Species Index		2-Year Average	Change Percent	
	1954	1955		From 1954	From Average
Mallard	255,530	249,093	252,311	- 2.5	- 1.3
Black Duck	92,706	74,839	83,772	- 19.3	- 10.6
Gadwall	-	1,165	582	-	+100.1
Baldpate	25,591	32,559	29,075	+ 27.2	+ 12.0
Pintail	22,099	47,108	34,603	+113.2	+ 36.1
G-w. Teal	5,835	13,486	9,660	+131.1	+ 39.6
B-w. Teal	8,514	4,208	6,361	- 50.6	- 33.8
Shoveler	3,138	1,008	2,073	- 67.8	- 50.4
Merganser	244,115	309,840	276,977	+ 26.9	+ 11.9
Redhead	7,597	10,340	8,968	+ 36.1	+ 15.3
Ringneck	39,825	80,178	60,001	+101.3	+ 33.6
Canvasback	18,151	21,625	19,838	+ 18.6	+ 8.5
L. Scaup	265,930	441,062	353,496	+ 65.8	+ 24.8
Goldeneye	48,389	37,785	43,087	- 21.9	- 12.3
Ruddy Duck	2,957	-	1,478	-	-
Bufflehead	23,291	39,050	31,170	+ 67.7	+ 25.3
Scoter	42,941	49,091	46,016	+ 14.3	+ 6.7
Total Ducks	1,106,609	1,412,337	1,259,473	+ 27.6	+ 12.1
C. Goose	28,417	23,566	25,991	- 17.1	- 10.3

Table VIII. - Summary of Brood and Potential Later Brood Information, July, 1955.

Stratum	No. Broods	Avg. No. / Brd. (Class II & III)		Total Yng.	PLB	Computed for Stratum	
		Total	Young			Total Young	PLB
Ontario C	51	6.7		341.7	49	123,729	17,743
Manitoba C	54	6.2		334.8	87	58,958	29,128
Manitoba D	53	7.6		402.8	142	29,525	10,408
Sask. C South	70	4.6		322.0	74	45,820	10,530
Sask. C North	19	7.0		133.0	22	80,066	13,244
<b>Total</b>	<b>247</b>	<b>6.2</b>		<b>1534.3</b>	<b>374</b>	<b>338,098</b>	<b>81,053</b>

Table VIII-A. - Summary of Brood and Potential Later Brood Information,July, 1954.Observed

Stratum	No. Broods	Avg. No. / Brd. (Class II & III)		Total Yng.	PLB	Computed for Stratum	
		Total	Young			Total Young	PLB
Ontario C	-	Not sampled in 1954					
Manitoba C	15	6.3		95	19	17,337	3,467
Manitoba D	29	7.0		189	58	6,124	1,879
Sask. C	22	7.2		144	52	49,565	17,898
Sask. E	17	6.0		102	48	13,097	6,163
<b>Total</b>	<b>83</b>	<b>6.4</b>		<b>530</b>	<b>177</b>	<b>86,123</b>	<b>29,407</b>

Table VIII-B. - Comparison of Young and Potential Later Brood, 1954-1955.

Stratum	No. Young		No. PLB	
	1954	1955	1954	1955
Ontario C	-	123,729*	-	17,743*
Manitoba C	17,337	58,958	3,467	29,128
Manitoba D	6,124	29,525	1,879	10,408
Northern Sask.	62,662	125,886	24,061	23,774
<b>Total</b>	<b>86,123</b>	<b>214,369</b>	<b>29,407</b>	<b>63,310</b>

Increase in Young observed (Manitoba and Saskatchewan only) - 148.9%

Increase in PLB observed (Manitoba and Saskatchewan only) - 115.3%

\* Not included in total.

Table IX. - Canada Goose - Broods and Adults, 1955.

Stratum	Observed				Computed for Stratum		
	No. Broods	Avg. No. /Brd.	Total Young	Adults	Young	Adults	Total
Ontario C	10	5.1	51	19	18,467	6,880	25,347
Manitoba C	6	2.5	15	48	2,641	8,453	11,094
Manitoba D	-	-	-	-	-	-	-
Sask. C South	-	-	-	-	-	-	-
Sask. C North	-	-	-	1	-	602	602
<b>Total</b>	<b>16</b>	<b>4.1</b>	<b>66</b>	<b>68</b>	<b>21,108</b>	<b>15,935</b>	<b>36,441</b>

1954

Ontario C	Not sampled	-	-	-	-	-	-
Manitoba C	3	4.0	12	7	2,190	1,277	3,467
Manitoba D	1	5.0	5	4	162	130	292
Sask. C	-	-	-	-	-	-	-
Sask. E	-	-	-	2	-	256	256
<b>Total</b>	<b>4</b>	<b>-</b>	<b>17</b>	<b>13</b>	<b>2,352</b>	<b>1,663</b>	<b>4,015</b>

Change in Canada Goose totals from 1954 (Manitoba and Saskatchewan only) -  
increase 191.3%.

Table X. - Total Duck Index - By Provinces , 1954-1955.

Province	Index			Change Percent						
	1954	1955	Average	From 1954	From Avg.	% Favored	Ducks 1954	Ducks 1955		
Ontario	435,562	373,259	404,410	-	14.3	-	4.7	66.8	65.4	66.2
Manitoba	280,318	380,429	330,373	+	35.7	+	15.1	78.8	80.1	79.5
Sask.	390,729	658,649	524,689	+	68.6	+	25.5	89.1	82.8	84.4
<b>Total</b>	<b>1,106,609</b>	<b>1,412,337</b>	<b>1,259,473</b>	<b>+</b>	<b>27.6</b>	<b>+</b>	<b>12.1</b>	<b>78.0</b>	<b>78.1</b>	<b>78.0</b>

### Summary and Conclusions

1. The survey area located in Ontario, northern Manitoba and northern Saskatchewan involves a total of 549,320 square miles. A coverage of 1728 square miles was accomplished during May, and 1809 square miles during July.

2. The phenology of the season was advanced over 1954. While the weather during May was not ideal, no severe storms affected the area. During July, weather and water conditions were about as ideal, especially in Manitoba and Saskatchewan, as can be expected.

3. On a strata basis the following information was computed relative to total ducks:

Stratum C Ontario	- decrease 14 percent
Stratum C Manitoba	- decrease 10 percent
Stratum D Manitoba	- increase 165 percent
Stratum C Saskatchewan	- increase 69 percent

4. Organized by Provinces, the following information was obtained:

Ontario	- 14 percent decrease from 1954
Manitoba	- 35 percent increase from 1954
Saskatchewan	- 69 percent increase from 1954

5. As a whole, an increase of 28 percent above 1954 in total ducks is indicated for the entire area. Only black ducks, blue-winged teal, shoveler, and goldeneye showed a definite decrease. Scaup and ring-necked ducks recorded a definite increase.

6. The total Canada goose population for the entire area was computed to be only about 25,000 birds. This population decreased approximately 17 percent from 1954.

7. In Manitoba and Saskatchewan the number of young increased 148.9 percent over July 1954. Ontario could not be included in the comparison because it was not sampled in July 1954.

8. An increase in potential later broods of 115.3 percent over 1954 was also recorded for the same area during July.

9. In spite of this increase there appeared to be no significant change in brood age from 1954.

10. Canada geese observed during July, including young and adults, increased 191.3 percent over July 1954 in Manitoba and Saskatchewan.

11. The colony of blue and snow geese at Eskimo Point was estimated at 13,000 adults. In 1953, when the colony was last observed, the number was estimated to be 15,000.

#### Forecast

On the basis of information gathered during May and July, and in view of the favorable weather conditions which prevailed during May, June, and July, in the survey area it is estimated that a duck crop of somewhat above average will be produced in Northern Manitoba and Northern Saskatchewan. Although the breeding population was down significantly (38.7 percent) in Ontario this May, it is possible, because of the favorable weather, that a duck crop equal to that of last year may be produced in this area.

## WATERFOWL BREEDING GROUND SURVEY IN QUEBEC AND LABRADOR, 1955

Fred A. Glover, Rossalius C. Hanson  
and  
A. P. Noltemeier

### Introduction

The 1955 aerial waterfowl breeding ground survey was conducted in the Provinces of Quebec and Labrador starting May 10 and ending July 25. An interlude starting June 7 and ending July 3, separates the breeding pair from the production survey. This is the fourth annual survey and in general the techniques used were the same as previous years. Changes were made to bring the aerial transects nearer the degree lines and the longest stretches made to run east and west (See Map). Due to mechanical problems with the aircraft, in early June, it was impractical to continue the breeding pair survey further north than Knob Lake. An attempt was made in July to run the production transects twice. This dual coverage would have encompassed the area between Ottawa and Knob Lake. Again, due to mechanical difficulties with the aircraft, we duplicated the areas as far north as Bagotville and on single transects reached Knob Lake as the most northern point. The data collected on the first run is not included in this report. There is a doubt as to its value for comparative purposes and, therefore, the inclusion of it would not add to this report. No tundra area was covered in either survey. Previous transects covering the St. Lawrence River area were not run; nor were any banding or production reconnaissance flights made in the tundra.

All the data collected in Ontario will be reported on by Mr. Ed. Wellein.

During the breeding pair survey personnel were Fred A. Glover and Rossalius C. Hanson acting interchangeably as pilot-observers. On the production survey A. P. Noltemeier and Rossalius C. Hanson acted in the same capacity. Flights consisted of 5,596 lineal transect miles covered on breeding pair survey and 5,004 lineal miles on production. Included were transects covered in Ontario and re-runs. A total of 170 hours was flown during the survey.

### Weather and Water Conditions

Over-all weather conditions followed a similar pattern during the summer. It was one of the hottest and driest on record. Forest fires started in May; old ones and new ones were flaring up all summer. Water conditions varied depending on location.

The season appeared to be ahead by a week or more in southern and eastern Ontario as compared with last year. Ice went out of Chibougamau Lake on May 3 this year as compared to the usual middle of May. However, in higher reaches of the Laurentians, the season was retarded. Ice was present in the

larger lakes on June 2, in the Ashwanipi area, and was not out until the 7th of June. West of Ashwanipi and Knob Lakes most of the lakes were free at the time mentioned above.

The Canadian goose and duck nesting areas south of James Bay and western Quebec were very dry. Muskegs showed little water. The Bagotville area, on the other hand, as well as local areas in eastern Quebec and Labrador, had very heavy winter snows and plenty of moisture. In these areas water conditions held up good during the summer.

In the open boreal and forest tundra area, a number of this summer's burns extended as far as one could see. Kapuskasing area had the hottest and driest June on record. Quebec, as a whole, averaged 40 to 50 percent below the normal rainfall, and five to 10 degrees above normal in temperature for June. Labrador was above normal in temperature by five degrees and had 50 percent of normal rainfall in June. Several large lakes were down five feet or more and muskegs were very dry in areas east of Knob Lake. Despite lower water conditions satisfactory nesting conditions prevailed in most areas.

#### Breeding Pair Survey

In comparing 1955 to last year's breeding populations, noticeable declines can be seen in practically all species of ducks. Tables I and II present a comparison of 1954 - 1955 data for comparable areas. The only species showing an increase was scaup. The general decline may be due to the later season in eastern portions of Quebec and Labrador where, at the time of the survey it appeared that all of the breeding populations had not arrived. In addition, the dry conditions may have altered normal nesting populations to the extent that these ducks were present in other areas of Canada. Very little of western Quebec above 52 degrees of latitude was covered. Birds may have been in that area due to a slow break-up in the eastern areas. Total ducks were down 23 percent from last year, while favored ducks were down only 14 percent.

Canada geese were down 53 percent by our findings. Climatic conditions probably did not move nesting populations to any extent. However, it may have retarded certain flights so that we did not pick them up on their nesting areas. Several late flights of Canada geese were reported to us while we were flying the nesting area transects.

#### Production Survey

For purposes of determining average duck brood size only complete broods seen were used in arriving at the figures in Table III. The average duck brood size was 4.60.

For comparative purposes all the duck broods, complete, incomplete, unclassed and unidentified were used in Table IV. This was done for comparative purposes with last year's data and also to give us a total brood and young duckling production. The average brood size in 1955 was 4.62 as compared to 4.35 in 1954, indicating an increase of six percent in brood size. Comparing total young produced we find it was down 21 percent from last year, and number of broods down 25 percent. Noting in our breeding pair count in May and June a decline of 23 percent, a reduced production of 21 percent was not unexpected.

Considering the Canada goose production the picture had taken an about face. Noting Table V we find the brood size reduced from an average size of 4.06 in 1954 to 3.59 in 1955, a decline of 12 percent. However, the number of young produced was up 49 percent over last year. The actual increases, in production, were noted in the plateau marshes of the Laurentians, particularly in the vicinity of Ashwanipi Lake and Knob Lake areas. We did not get over the goose breeding areas in the tundra. Secondhand information from the tundra areas indicated a late season and may involve some decrease in goose production there. It appears that a good portion of the goose population did get on the nesting areas with an increased production; although we did not record them in our May and June transect flights.

In considering potential later brood influences on duck production, the data gathered did not offer much in the way of concrete prognosis. The data indicated a normal breeding season with no more than a normal potential later brood anticipated.

#### Summary

Although transects were changed slightly this year the data gathered was comparable with 1954. Climatic conditions causing a population movement may have been the factor involved in decrease in duck populations and production. Canada goose production was up. The fact that the tundra area was not covered, may alter the goose picture to a slight degree. The production picture this year for the Eastern Canadian Provinces did not show a radical change. Considering the weaknesses still remaining in our survey methods the waterfowl status can be considered unchanged from last year.

Table I. - Comparison of 1954-1955 Data on Waterfowl Breeding Pair Survey with Index Figure on Total Birds  
by Strata - Quebec and Labrador.

Species	Mixed	Boreal	Main	Boreal	Open B.	F. Tundra*	Total		% Change
	1954	1955	1955	1955	1954	1955	1954	1955	
Black Duck	9,926	7,351	129,835	55,242	185,865	118,697	325,624	181,290	- 44
Goldeneye	14,062	1,470	180,109	61,601	175,222	119,430	369,393	182,503	- 51
Ringneck	10,340	-	36,119	-	2,938	-	49,297	-	-
Pintail	4,136	-	976	-	2,838	2,931	7,950	2,931	- 61
Scaup	-	-	-	4,687	36,179	41,764	36,179	46,451	+ 28
Merganser	16,544	5,146	185,478	97,092	168,128	101,113	370,150	203,351	- 45
Scoter	-	-	3,417	25,780	88,675	41,764	92,092	67,544	- 27
Unidentified	5,790	4,411	31,726	114,167	60,299	231,533	97,815	350,111	+258
Total Ducks	60,798	18,378	567,660	358,571	720,042	657,232	1,348,500	1,034,181	- 23
Favored Ducks	44,254	13,232	378,765	235,699	463,239	514,355	886,258	763,286	- 14
Canada Goose	8,272	-	2,440	3,348	134,077	64,478	144,789	67,826	- 53
Sq. Mi. Covered	72.0	40.5	372.5	540.0	534.5	517.5	979.0	1098.0	
Sq. Mi. in Stratum	29,780		180,820		379,180			589,780	
Total Ducks/									
Sq. Mi.	2.042	0.617	3.139	1.983	1.899	1.733	2.286	1.754	
Favored Ducks	1.486	0.444	2.095	1.304	1.222	1.357	1.503	1.294	
Canada Goose									
Per Sq. Mi.	0.278	-	0.013	0.019	0.354	0.170	0.245	0.115	

\* Open Boreal and Forest Tundra.

+ Excluding Merganser and Scoter.

**Table II. - Index to the Number of Pairs, Singles, Grouped and Total Birds of the More Important Species  
Observed in Quebec and Labrador, 1954 and 1955.**

Species	1954	1955	1954	1955	1954	1955	1954	1955
Black Duck	56,135	37,081	35,943	20,493	105,103	66,141	289,259	181,289
Goldeneye	74,105	36,714	50,973	33,490	54,825	42,094	304,981	182,502
Scaup	12,624	12,330	3,580	5,400	5,625	10,991	38,033	46,451
Unidentified	23,002	57,058	34,733	57,249	37,888	121,495	153,358	350,109
<hr/>								
Sub-Total								
Favored Ducks	165,866	143,183	125,229	116,632	203,441	240,721	785,631	760,351
Merganser	54,767	36,106	62,670	53,437	114,440	24,263	349,314	203,349
Scoter	18,249	6,594	9,555	1,737	57,102	50,881	112,710	67,543
<hr/>								
Sub-Total								
Non-Favored Ducks	73,016	42,700	72,225	55,174	171,542	75,144	462,024	270,892
<hr/>								
Total Ducks	238,882	185,883	197,454	171,806	374,983	315,865	1,247,655	1,031,243
<hr/>								
Canada Geese	33,270	16,852	22,399	14,863	50,514	4,396	161,852	67,826

**Table III. - Duck Brood Production Indices, Quebec and Labrador - 1955.**

Class II & III	Strata					Total
	Mixed Boreal	Main Boreal	Open Boreal & Forest Tundra	Tundra		
No. Broods	0	9,328	11,387	0	21,715	
Average Size	0	4.92	4.33	0	4.60	
No. Young	0	45,920	49,342	0	95,262	

NOTE: The above table is Class II and III broods combined to get average number of ducklings per brood. It is based on complete broods observed and does not give a true picture of total production. No transects run in Tundra Stratum.

**Table IV. - Duck Brood Production Indices, Quebec and Labrador - 1955.**

Class I	Strata					Total 1954	% Change
	Mixed Boreal	Main Boreal	Open Boreal & Forest Tundra	Total 1955			
No. Broods	0	0	285	285	12,890		
Average Size	0	0	7.00	7.00	4.58		
No. Young	0	0	1,995	1,995	50,080		
<b>Class II</b>							
No. Broods	0	5,962	12,525	18,487	17,207		
Average Size	0	5.83	4.50	4.93	4.27		
No. Young	0	34,759	56,363	91,122	73,423		
<b>Class III</b>							
No. Broods	0	6,953	3,131	10,084	8,462		
Average Size	0	4.14	3.67	3.99	4.18		
No. Young	0	28,785	11,491	40,276	35,409		
<b>Totals</b>							
No. Broods	0	12,915	15,941	28,856	38,559	-25.16	
Average Size	0	4.92	4.38	4.62	4.35		
No. Young	0	63,544	69,849	133,393	167,912	-20.55	

NOTE: Above data based on adjusted broods. Includes incomplete and unclassed broods in ratio to complete classed broods.

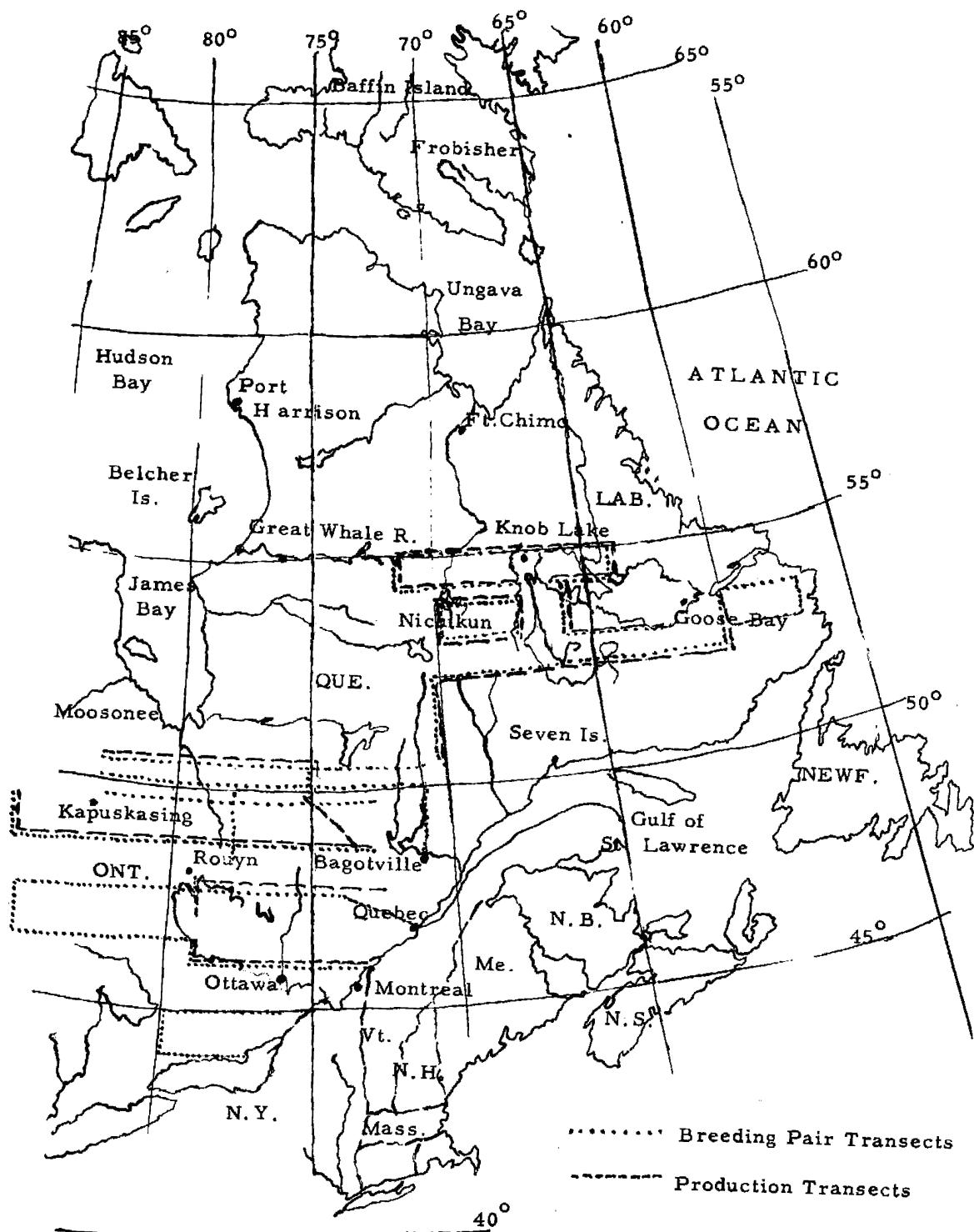
- No transects run in Tundra Stratum in 1955. 1954 figures have been corrected by omitting Tundra data for that year for comparative purposes.

Table V. - Goose Brood Production Index, Quebec and Labrador - 1955.

	Strata			Totals 1955	Totals 1954	% Change
	Mixed Boreal	Main Boreal	Open Forest			
<u>Class I</u>						
No. Broods	0	0	0	0	0	
Average Size	0	0	0	0	0	
No. Young	0	0	0	0	0	
<u>Class II</u>						
No. Broods	0	0	3,796	3,796	3,686	
Average Size	0	0	3.40	3.40	4.50	
No. Young	0	0	12,905	12,905	16,576	
<u>Class III</u>						
No. Broods	0	0	8,350	8,350	3,957	
Average Size	0	0	4.00	4.00	3.66	
No. Young	0	0	33,400	33,400	14,483	
<u>Totals</u>						
No. Broods	0	0	12,146	12,146	7,643	+58.91
Average Size	0	0	3.59	3.59	4.06	
No. Young	0	0	46,305	46,305	31,059	+49.08

NOTE: No transects run in Tundra Stratum in 1955. For comparative purposes Tundra data for 1954 were deleted from totals.

Figure 1





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## WATERFOWL BREEDING GROUND STUDIES-MARITIME PROVINCES, 1955

George F. Boyer, Brian C. Carter and Jean Vaillancourt

### Introduction

Annual waterfowl breeding ground studies have been carried out in the Maritime Provinces since 1949. This year, for the first time, the work was carried out entirely by the Canadian Wildlife Service.

Certain revisions in the aerial survey were made this year. The boreal forest transects in southwestern New Brunswick and Nova Scotia were discontinued as it was believed that better results could be obtained by employing the time and personnel on an increased program of ground survey work.

The same aircraft were used as last year, and once again thanks is expressed to Mr. G. L. Miller, Chief Forester, Department of Lands and Mines, Fredericton, N. B., and Mr. G. W. I. Creighton, Deputy Minister, Department of Lands and Forests, Halifax, N. S., for the use of Provincial aircraft.

An intensification of ground study work was undertaken during both the spring and summer surveys in New Brunswick and Nova Scotia. It is believed that ground survey work in this region will produce better results during the summer brood production counts. An additional advantage in ground coverage during the brood season is that banding of locally raised birds may be carried out with the aid of dogs.

In addition to banding with the aid of dogs, traps were operated in the New Brunswick-Nova Scotia border region.

### Methods

Spring, summer, and pre-hunting season surveys were carried out by air. Figures obtained by this method are used in trend comparisons in this report. Ground surveys were intensified and will be repeated and probably increased next year. It is hoped in future to have enough material from ground surveys to use in brood trend comparisons.

### Weather and Water Conditions

During the winter of 1954-1955 the precipitation throughout the Maritimes was very high. In northern New Brunswick and Nova Scotia and throughout Prince Edward Island there was a heavy blanket of snow. This snow disappeared without causing any abnormal fluctuations in water levels.

A comparison of weather conditions with normal is found in Table I. These data include a coastal area (Halifax) and an inland area (Moncton).

Generally speaking it will be noted that the spring was backward and temperatures consistently below normal except during August. Rainfall was below normal during most of the spring and summer.

This weather was not apparently adverse to early breeding and young blacks were found able to fly during the first week of July. Late nesting species such as the blue-winged teal and ring-necked duck should have done well in the Saint John River area, as conditions in late summer there were much improved over last year.

Low water levels apparently caused the late summer concentrations to leave many of the smaller water areas. There is an apparent scarcity of birds in these areas, and a noticeable increase in the flocks in larger water areas such as the lower Saint John River.

#### Breeding Population Trends

Table II shows an apparent increase in most of the preferred game species. There was a noticeable increase in black ducks, but what appeared to be a drop in the number of unpaired ringnecks. The numbers of paired birds should be a better indication of the local spring status, as most of these birds are scattered on territory. No doubt the flocks of unpaired birds contain many transients of doubtful status.

#### Success of the Season

Table III contains comparative aerial brood survey data for the last three years. Owing to difficulties in obtaining aircraft it was impossible this year to duplicate our former coverage. Ground surveys, however, were intensified, and, as already mentioned, will form the basis for future brood comparisons.

Table III shows a decided decrease in the number of "adult" birds seen, although the total number of broods is the highest for the three-year period. Black ducks showed an increase over last year of both "adults" and broods, while numbers of "adult" ringnecks were much below normal. This latter situation may have been caused by a better situation as regards nesting activities this year.

Table I. - Weather Conditions, Moncton and Halifax, Spring and Summer Period, 1955.

	March		April		May		June		July		August	
	M	H	M	H	M	H	M	H	M	H	M	H
Average mean Temperature (F) (Normal)	25.6 (27.2)	31.6 (30.8)	36.9 (37.8)	39.9 (39.6)	47.7 (49.7)	49.6 (49.1)	56.8 (58.1)	56.2 (57.8)	65.9 (66.4)	63.2 (64.7)	64.8 (64.3)	65.7 (64.8)
Total Precipitation Inches (Total Rain plus 1/10 Snowfall) (Normal)	3.94 (3.06)	4.61 (4.73)	1.95 (3.19)	3.80 (4.48)	2.02 (3.43)	2.77 (4.28)	No Snowfall During This Period					
Rainfall Inches (Normal)	2.44 (1.51)	3.51 (3.54)	1.91 (2.09)	3.54 (3.92)	2.02 (3.39)	2.77 (4.27)	1.58 (3.45)	2.82 (3.92)	3.20 (2.87)	3.26 (3.80)	3.43 (3.47)	3.84 (4.26)
No. of Days with Precipitation (Normal)	16 (14)	18 (15)	9 (13)	11 (14)	15 (14)	12 (14)	12 (12)	15 (13)	11 (10)	10 (12)	12 (10)	16 (12)
Total Hours of Sunshine (Normal)	? (146.0)	163.0	? (157.5)	174.2	? (195.4)	189.9	? (204.7)	174.7	306.7	236.4 (241.6)	179.8	198.4 (221.2)

M = Moncton

H = Halifax

Table II. - Spring Waterfowl Survey, Maritime Provinces - Aerial Comparison, 1954 - 1955.

Year	Preferred Game Ducks						Others				Total Pref.			
	Black	Pintail	G-w.T.	B-w.T.	Ring.	Gold.	Scaup	Unid. & Others	Scoters & Eiders	Merg.	Total Ducks	Game Ducks	Geese	Brant
1954	296/159	3/3	13/4		10/3	64/37	1/0	0/0	Scoters 335	9/13	4,954	4,468	887	2,204
	2,162	0	170	-	416	337	29	158	Eiders 50	47				
1955	365/199	5/2	14/2	7/1	51/10	56/21	4/0*	12/2	Scoters	99/1	5,898	5,135	2,420	2,162
	2,537	0	98	16	222	463	215	98	172	291				

NB. Explanation of Figures: - 296/159

2,162        296 = pairs seen; 159 = lone drakes; 2,162 = birds in flocks.

For the purpose of obtaining total number of ducks, pairs and lone drakes are doubled and added to birds in flocks, e. g.:

296/159

2,162 - 3,072 (Total blacks 1954 survey)

**Table III. - Comparable Aerial Brood Data.**

Year	Black Duck		Ringneck		Goldeneye		Ducks (Total Game)	
	Adults	Brds.	Adults	Brds.	Adults	Brds.	Adults	Brds.
1953	1,211	55	170	8	74	10	1,555	68
1954	475	44	210	-	61	2	816	47
1955	532	48	62	9	27	8	727	73

**Brood Production and Survival**

During ground survey work throughout the Maritime Provinces a total of 146 complete broods was tallied. A break-down of this total is found in Table IV.

**Table IV. - Break-down of Broods Tallied.**

Species	Class I		Class II		Class III	
	Broods	Ducklings	Broods	Ducklings	Broods	Ducklings
Black	29	8.0	26	7.0	6	6.7
Pintail	3	8.0	-	-	-	-
G-w. Teal	4	8.3	2	7.0	1	6.0
B-w. Teal	3	8.7	2	8.0	2	6.0
Wood Duck	5	7.6	-	-	-	-
Ringneck	17	7.8	13	6.0	2	5.5
Goldeneye	17	6.4	13	6.0	1	5.0
All Species 1955						
	78	7.6	56	6.6	12	6.2
All Species 1954						
	33	8.4	64	5.8	12	5.7

Brood survival as indicated in the number of Class II and III ducklings per brood was greater for all species this year than for either 1953 or 1954.

**Pre-Hunting Season Surveys**

Aerial surveys were carried out again in Prince Edward Island and the New Brunswick-Nova Scotia border region. The results of these surveys (Table IV) will give an idea as to which species will receive the brunt of opening day shooting pressure in those areas. It would appear that the southward migration

is behind last year. Species such as Canada goose and merganser were seen in small numbers while earlier migrants such as blue-winged teal and ringnecks were still showing up strongly.

The position of the black duck is not quite so clear. The smaller number seen this year could be attributed to dispersal of local birds as well as a delay in arrivals from the north.

#### Pre-Hunting Season Surveys

Species	Prince Edward Island			New Brunswick-Nova Scotia Border Transects	
	1953	1954	1955	1954	1955
Canada Goose	450	469	100	-	-
Black Duck	8,900	10,792	6,392	952	578
Pintail	63	56	33	17	29
G-w. Teal	-	1,839	832	283	150
B-w. Teal	-	205	1,991	252	325
"Teal"	250	-	-	-	-
Ringneck	500	184	1,502	32	204
Goldeneye	30	-	57	-	-
Merganser	6,400	1,847	336	2	-
Eider	-	87	-	-	-
Scoter	400	289	95	-	-
Unidentified and Others	150	89	425	7	14
Total	17,143	15,857	11,763	1,545	1,300
Favored Sporting Species *	10,343	13,634	11,332	1,543	1,300

\* Exclusive of mergansers, eiders, and scoters.

#### Summary

The 1955 breeding season was generally good for both early and late nesting species. The dry weather has caused many of the smaller marsh areas to dry up and the autumn concentrations of ducks may be confined to the larger areas of habitat such as the lower Saint John River.

Black Ducks - Young birds were awing early this year and appeared in summer concentrations in mid-July, as compared with early August last year. All indications point to a good season for this species, but many of the small marsh areas have been vacated owing to dry weather.

Pintail - Although this species is not an important contributor to the shooting in this region, it is interesting to note that the colony in the New Brunswick-Nova Scotia border area has climbed out of the slump which it has been in for the last four years.

Teal - Both species of teal did well this year, particularly the blue-wing which appears to have recovered from last year's set-back.

Ringneck - The ringneck also had a good season and survey results now leave no doubt that this species is second in abundance to the black duck. It would seem to be even more widely dispersed than the black in the inland lakes of Nova Scotia.

Goldeneye - The goldeneye also had a successful season. This species is common locally in the lower Saint John Valley and the Miramichi River basin in New Brunswick, and in the Baddeck area of Nova Scotia.

#### Banding

During banding operations 198 flightless young were banded with the aid of a Labrador retriever and approximately 320 ducks were trapped in the New Brunswick-Nova Scotia border region.

## WATERFOWL BREEDING GROUND SURVEY IN WASHINGTON, 1955

Robert G. Jeffrey and Wendell H. Oliver

Introduction

Personnel contributing field data to this report are as follows: Homer I. Brent, Donald S. Galbreath, Stanley E. Guenther, Russell W. Hupe, Robert G. Jeffrey, Wendell H. Oliver, Carl V. Swanson and Fred C. Zwickel, all biologists of the Washington State Game Department, and Wayne Hanson, Wildlife Technician, Hanford AEC Project, Richland, Washington.

The 1955 waterfowl breeding ground survey is the ninth such inventory carried out in Washington. Field data was collected under the supervision of the two waterfowl biologists by resident biologists in each of the various game districts of the State.

The waterfowl breeding habitat of eastern Washington is composed mostly of potholes, and produces about 70 percent of the ducks raised in the State. Here, the productivity is highly dependent upon adequate winter and spring precipitation.

Central Washington, including the Columbia Basin, contains most of the irrigated lands of the State, and the bulk of its duck production is from such habitat. This region produced about 23 percent of the duck crop in 1955.

Most of the duck production in western Washington originates in the lower valleys and flats of the many river systems. The breeding habitat is extensive, but much lower in productivity than the areas east of the Cascade Mountains. The region accounted for about seven percent of this year's duck production.

Method of Sampling

It has been determined from extensive aerial counts in eastern Washington that under optimum water conditions approximately 10,000 potholes exist. This number provides a base for compiling the waterfowl production index. Standard one-fourth mile ground transects have been set up to include about five percent of the annual breeding population of this region.

A slightly different method is applied to the irrigated areas of central Washington. With the variety of habitat encountered here, it was found necessary to make a complete survey of randomly chosen square-mile blocks of this land. These sample sections amounted to about a three percent sample in the Columbia and Yakima basin irrigation projects in 1955.

In western Washington heavy cover and the diversity of habitat preclude the use of the standard transect. The production index for this region is based upon habitat-type productivity studies made in 1948 and 1949, and upon approximations of the amount of each habitat type, which were made from the best maps available. The production index thus arrived at has been adjusted yearly by means of a brood trend census on established plots.

#### Weather and Water Conditions

The growth of cover and waterfowl breeding activities were considerably retarded over the entire State during the spring of 1955. Following the coldest spring on record, periods of hot, dry weather rapidly reduced the amount of pothole habitat. Although the eastern Washington pothole index showed an eight percent increase during the May survey, this increase occurred in the yellow pine zone of northeastern Washington, a breeding area of lesser importance. Potholes in the remaining areas continued to shrink despite increased seasonal rainfall, and by mid-July only 50 percent of the May survey water remained. Floods and hail storms caused some local damage to nesting and broods. Excellent water conditions prevailed in central Washington irrigation areas, and in western Washington throughout the summer.

#### Breeding Population Trends and Brood Data

The decrease of the total breeding population east of the Cascades was negligible in 1955. Although the decline occurred largely among the more important duck species, ensuing production made some significant changes. The teal group, the diving ducks, gadwall and shoveler, all present in increased numbers on the breeding grounds, showed decreases in relative production. By contrast, mallard and baldpate both showed a decrease in the breeding population, but increased in production in 1955. Relative production gains generally occurred among early nesting species, the species utilizing the northern timbered habitat and those using the irrigation areas. The gradual drying of the open country potholes is reflected in the production decreases in species favoring these areas.

The Yakima River basin supported an average of 12.5 breeding waterfowl per square mile in 1955. In the Columbia Basin, where the section-sample method was employed for the first time, an average of 1.9 waterfowl per square mile was found. Increased use is expected as the habitat improves and becomes more established.

East of the Cascades the nesting season was approximately three weeks late, with the peak of the hatch occurring during the last week of June. Although a late nesting season was also in evidence in 1954, 95 percent of the hatch was out by July 1, while this year only 77 percent of the hatch was complete prior to that date. The belated appearance of mallard broods characterized the 1955 season throughout the State.

Washington brood records for the past eight years are summarized and compared in Table I. The effect of a changing habitat on the composition of the duck crop, as discussed above, is well shown by comparing the percentages for the mallard and baldpate with those of the other dabbling ducks.

Table I. - Species Composition of Duck Brood Records for Entire State, 1948-1955.

Species	7-Yr. Total 1948-1954		Total Broods 1954		Total Broods 1955	
	Broods	%	Broods	%	Broods	%
Mallard	3,618	40.2	365	50.6	377	53.2
Pintail	382	4.2	36	5.0	23	3.2
Gadwall	645	7.2	48	6.6	28	3.9
Baldpate	645	7.2	76	10.5	88	12.4
Green-winged Teal	465	5.2	17	2.4	15	2.1
B-w. & Cinn. Teal	1,100	12.2	69	9.6	62	8.7
Shoveler	394	4.4	27	3.7	7	1.0
Wood Duck	236	2.6	18	2.5	35	4.9
Redhead	625	6.9	20	2.8	13	1.8
Scaup	227	2.5	7	1.0	8	1.1
Goldeneye	143	1.6	15	2.1	32	4.5
Ruddy Duck	383	4.3	17	2.4	14	2.0
Mergansers	60	0.6	5	0.7	6	0.8
Miscellaneous*	66	0.8	2	0.3	2	0.3
Total	8,989		722		710	

\* Includes harlequin, canvasback and ring-necked duck.

A total of 645 duck broods were classified by size during the 1955 season. The average size of all Class III broods was comparatively good (6.0). However, there was considerable variance in average brood size between the broods of the pothole areas and those of the irrigation projects. The latter averaged 6.3 young (Class III), while elsewhere in eastern Washington the average was only 5.7. The State summary is given in Table II.

Table II. - Duck Brood Size by Age Class, Entire State, 1955.

Species	Class I		Class II		Class III	
	Number Broods	Average Size	Number Broods	Average Size	Number Broods	Average Size
Mallard	109	5.8	123	5.6	65	6.2
Pintail	13	6.8	6	6.0	4	7.0
Gadwall	12	4.3	7	4.0	7	6.9
Baldpate	51	4.5	32	5.8	3	5.7
Green-winged Teal	1	7.0	13	5.2	1	10.0
B-w. & Cinn. Teal	33	6.3	14	4.6	1	6.0
Shoveler	2	8.0	2	6.0	3	5.2
Wood Duck	16	5.2	5	4.8	-	-
Redhead	10	6.4	1	3.0	2	5.2
Ring-necked Duck	2	4.0	-	-	-	-
Scaup	6	6.3	2	8.0	-	-
B. Goldeneye	8	5.5	8	6.0	-	-
Ruddy Duck	10	5.2	2	2.0	-	-
Hooded Merganser	-	-	1	2.0	2	1.0
Am. Merganser	2	7.0	1	6.0	-	-
Unidentified	27	5.7	25	4.9	9	6.8
All Broods, 1955	305	5.6	242	5.4	98	6.0
All Broods, 1954	308	6.2	210	5.4	69	5.8

The waterfowl population index for central and eastern Washington showed a three percent decrease from 1954. As indicated in Table III, most of the loss occurred in eastern Washington, while the late, but improved, brood success in central Washington resulted in a very negligible decrease in irrigation land production. Total production includes about 11,000 Canada geese and 35,000 coot.

In western Washington 28 percent fewer broods were recorded for the brood trend plots. Total young, plus adults, seen on the plots were down 34 percent for mallards, 24 percent for wood ducks, and up 29 percent for blue-winged and cinnamon teal. Coots also were up 18 percent.

Table III. - Waterfowl Production Index\* - Washington.

Region	1951	1952	1953	1954	1955
Eastern Washington	588,000	617,400	287,000	285,000	275,000
Central Washington	63,100	66,900	77,500	92,500	91,500
Western Washington	35,000	31,000	38,000	35,000	25,300
Total	686,100	715,300	402,500	412,500	392,200

\* This index is young, plus adults, at end of brood season.

### Canada Goose Production

For the sixth consecutive year an inventory of the island nesting habitat of the basin Canada goose on the Columbia and Snake River systems of south-central Washington was undertaken. The study area embraces 265 miles of river and is divided into five separate units, each requiring individual evaluation. Unit I, a 45 mile section of the Columbia River bisecting the Hanford AEC Reservation, is utilized as a more intensive study area. In 1955, 253 goose nests were followed to completion in the area.

The breeding pair population of the river system showed an average of 3.78 breeding pairs per mile of river in 1955, which is a slight increase over 1954 (Table IV). The additional pairs were found on the Columbia River units. Most encouraging was the larger number of pairs found in the portion of the Columbia River included in the McNary Reservoir (Unit II). With the formation of the McNary pool late in 1953, 22 islands of nesting importance to Canada geese were inundated. Although new islands were created, they were small and few in number. The majority of the resident geese were expected to shift to other sections of the river for nesting. Few left, however, and large resident flocks appeared in the pool area. In 1955 more breeding pairs were found, most of them utilizing the peninsulas and dikes of the McNary Game Range for nesting. Apparently the nesting population of this once important area is being revived, although the new habitat is not expected to fully compensate for what was lost.

Table IV. - Canada Goose Population Density in South-Central Washington,  
1952 - 1955.

Areas *	Total Miles of River Habitat	River Miles Inventoried				Pairs of Geese (Avg. Per River-Mile)			
		1952	1953	1954	1955	1952	1953	1954	1955
Unit I	40	40	40	40	40	211 (7.8)	304 (7.6)	299 (7.5)	346 (8.7)
Unit II	47	38	38	47	47	139 (3.7)	129 (3.4)	99 (2.1)	105 (2.3)
Unit III	92	65	10	50	42	303 (4.7)	49 (4.9)	213 (4.2)	184 (4.4)
Unit IV	35	35	35	35	35	91 (2.6)	99 (2.8)	110 (3.1)	88 (2.5)
Unit V	51	-	-	41	41	-	-	48	40 (1.2) (1.0)
Total	265	178	123	213	205	844 (4.7)	578 (4.7)	769 (3.6)	763 (3.8)

\* Units I, II, III are on Columbia River; Units IV & V are on Snake River.

The retarded spring of 1955 apparently had little effect upon the hatching period of the Canada goose, as the pattern was identical with that of 1954. The peak of hatching occurred during the fourth week of April with 45 percent of the broods appearing at that time. During the summer 205 miles of river were investigated and 392 goose nests were located. From the more concentrated study in Unit I it was found that although the breeding population was larger fewer nests resulted. However, nesting success was better (73 percent in 1954, 78 percent in 1955) and brood mortality was less. As a consequence, a 10 percent increase in the summer population of the rivers fixed the index at 5,700 birds.

Unlike the river geese, the scabland geese were affected by the severe spring weather. Although production on some of the large lakes and reservoirs of the Columbia Basin showed improvement in 1955, the total summer population for central and eastern Washington approximated that of 1954.

## Banding

Table V. - Waterfowl Banding Summary - July 1 to October 10, 1955.

## WATERFOWL BREEDING GROUND SURVEY - OREGON, 1955

Chester E. Kebbe

### Introduction

Waterfowl breeding ground surveys in Oregon were conducted in essentially the same manner as in previous years. Some of the samples were discontinued, however, due to lack of personnel or assignment of game agents to other game problems.

### Methods of Sampling

All sampling work was by the ground transect method. No aerial transects were flown. Due to an insufficient number of personnel working on waterfowl no attempt has been made to record total breeding birds within the State nor compute the total State production.

### Weather and Water Conditions

Inclement spring weather over the major breeding grounds retarded duck nesting as much as three weeks. Canada geese which nest early came off on normal dates and prior to the unsettled spring weather.

The large marshes of eastern Oregon, the major waterfowl production areas, continued to dry up. Snowfall during winter of 1954 was very short, resulting in little run-off. Little moisture fell during the spring of 1955 despite the cold weather and almost continuous overcast. Most of the small lakes in Harney and Warner Valleys are now dry lake beds.

### Breeding Population Trends

Although some counts are made of breeding pairs these are felt to be very inaccurate. As late as June 1, when broods of early nesters make their appearance there are still a number of migrants going through Oregon. This is especially noticeable in western Oregon where duck production is confined almost entirely to a few mallards and wood ducks.

### Success of the Season

Canada goose production in the Klamath Basin shows a slight increase but elsewhere the production is down considerably. The downward trend in production indicated in the preliminary report is substantiated in the final check.

Table III shows production on a sample at Summer Lake. This sample was run on August 8. In previous years the samples were checked in July. On July 26 only 38 broods were tallied, all in Class I and Class II.

Table I. - Canada Goose Broods on Six Permanent Samples in the Klamath Basin.

Sample Area	Square Miles	No. of Broods		Total Young		Avg. Young Per Brood	
		1954	1955	1954	1955	1954	1955
Spring Lake	3	5	11	21	56	4.2	5.1
Alkali Lake	2	3	9	12	51	4.0	5.7
Sprague River	18	23	46	94	225	4.1	4.9
Klamath River	10	155	161	723	744	4.7	4.6
Klamath Marsh	12	25	25	101	99	4.0	4.0
Hooper Tract and Seven Mile Marsh	8	9	4	46	22	5.1	5.5
Total	53	220	256	997	1,197	4.3	4.7

Table II. - Comparison of Canada Goose Brood Counts in Klamath Basin.

Year	No. of Broods	Total Young	Average Young Per Brd.
1952	204	1,021	5.0
1953	248	1,086	4.4
1954	223	997	4.5
1955	256	1,197	4.7

Table III. - Average Brood Size by Age Classification of Four Square Miles at Summer Lake.

Species	Females W/Brds.	Class I			Class II			Class III		
		No. Brds.	No. Yng.	Avg. Size	No. Brds.	No. Yng.	Avg. Size	No. Brds.	No. Yng.	Ave. Size
Mallard	34	11	80	7.3	18	120	6.3	5	33	6.6
Cinn. Teal	26	10	70	7.0	12	84	7.0	4	27	6.7
Gadwall	34	12	90	7.5	19	141	7.4	3	19	6.3
Redhead	37	23	146	6.3	14	90	6.4	-	-	-
Shoveler	3	1	8	8.0	1	7	7.0	1	6	6.0
Ruddy	9	4	25	6.3	5	33	6.6	-	-	-
Total	143	61	419	6.9	69	475	6.9	13	85	6.5
C. Goose	48	11	47	4.3	19	89	4.9	18	77	4.3

The 1954 census showed 202 ducks and 107 geese with broods.

Elsewhere in eastern Oregon over samples which are not run consistently each year the following complete broods were tallied:

Table IV. - Waterfowl Brood Census in Eastern Oregon.

Species	Females With Broods	Number Of Young	Average Size
Mallard	17	107	6.3
Cinnamon Teal	6	42	7.0
Gadwall	1	9	9.0
Redhead	7	44	6.3
Wood Duck	2	7	3.5
Shoveler	2	10	5.0
Total	35	219	6.3

In western Oregon where the main breeding species are the mallard and wood duck the following counts were obtained:

Table V. - Waterfowl Brood Census in Western Oregon.

Species	Females With Broods	Number Of Young	Average Size
Mallard	5	32	6.4
Wood Duck	13	70	5.4
Total	18	102	5.7

#### Nesting Studies

Wood duck nesting studies are continuing on Sauvie and Government Islands. This is the third year of the study in which 350 nest boxes are under constant observation.

#### Banding

During the period of June 1 through October 6 a total of 4,428 ducks, 53 geese and 59 coots was banded. Sixteen wood ducks banded in nest boxes in April and May are also included.

Table VI. - Waterfowl Banded in Oregon, June 1 Through October 6, 1955.

<u>Species</u>	<u>Adult Males</u>	<u>Immature Males</u>	<u>Adult Females</u>	<u>Immature Females</u>	<u>Unsexed Adults</u>	<u>Unsexed Immatures</u>	<u>Total</u>
Mallard	497	823	653	356	-	-	2,329
Pintail	357	461	378	333	-	-	1,529
Baldpate	2	31	2	23	-	-	58
G-w. Teal	-	6	-	1	-	-	7
Gadwall	-	17	1	25	-	9	52
Shoveler	-	-	1	-	-	-	1
Cinn. Teal	-	38	1	28	-	9	76
Wood Duck	5	91	172	76	-	-	344
Redhead	-	13	-	11	-	8	32
 <b>Total</b>	 861	 1,480	 1,208	 853	 -	 26	 4,428
C. Goose	2	9	3	3	34	2	53
Coot	-	-	-	-	-	59	59

Summary

1. Production of ducks and geese in the eastern Oregon marsh areas was down on most species.
2. Geese nested on normal dates but duck nesting was retarded three weeks due to a late spring.
3. Many potholes and marsh areas are drying up due to a lack of winter snow fall and summer precipitation.
4. A total of 4,428 ducks, 53 geese and 59 coots was banded during the pre-season period.

## WATERFOWL BREEDING GROUND SURVEY IN CALIFORNIA, 1955

A. W. Miller, A. E. Naylor and Frank M. Kozlik\*

### Introduction

During the spring and early summer of 1955, the waterfowl breeding ground survey was conducted in essentially the same manner as in previous years throughout the principal waterfowl habitat of the State. By way of review it should be noted that under existing conditions the primary waterfowl production areas in California are in the northeast or "Great Basin" corner of the State, and in the Sacramento Valley.

The northeastern part of the State, including the Klamath Basin, contains numerous natural marshes and artificial water impoundments. The scattered distribution of these water areas with this great basin-type region makes it impractical to fly aerial transects. Instead, this entire area was given complete aerial coverage of all water and marsh areas to determine the total numbers of breeding waterfowl. To obtain further information on waterfowl production in this part of the State, a nesting study was conducted at Mountain Meadows (Walker Reservoir).

The Sacramento Valley is devoted to intensive agriculture with only a remnant of the once vast marshlands remaining. The remaining marsh and overflow lands are largely in private ownership and are controlled primarily by private duck clubs. Coupled with these remnants of marshland, the culture of rice as a commercial crop is responsible for a large portion of the waterfowl raised in this valley. From late April through the middle of September, over 290,000 acres of shallow stabilized water in the form of contoured rice fields are available to nesting ducks. Before the rice grows too high, this area can be ideally covered by aerial transect flights. Later in the season, however, brood counting and fall population counts are difficult to accomplish due to the dense cover growth and the inaccessible nature of these areas on foot. In contrast to northeastern California where a variety of waterfowl species nest, the primary species meeting in the Sacramento Valley is the mallard.

The remainder of the waterfowl produced in California is raised in scattered sections of agricultural and marsh habitat including tidal saltmarshes, stream channels, and artificial impoundments. These areas include the Suisun marsh, Sacramento-San Joaquin river delta, the grasslands of the San Joaquin Valley, and the North Bay. In many cases, production is high on these areas, but is limited in significance by the relatively small size of the area and the amount of water. A nesting survey was carried on in the grasslands.

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\* Other personnel of the Federal Aid in Wildlife Restoration Project California 30-R, namely William Anderson, P. H. Arend, John R. LeDonne and E. G. Hunt cooperated in this study.

### Weather and Water Conditions

The over-all rainfall in Central Valley was normal for the 1954-1955 season. However, most of the winter was dry, so that it took heavy spring rains to bring precipitation up to average. Parts of Northeastern California were extremely dry and some waterfowl areas, such as Horse Lake, and Honey Lake were either dry or in critical condition.

Evidently the dry winter caused migration to start early with many birds moving up into the Tule-Klamath Basin in February. This early movement of waterfowl was followed by the late wet spring, which caused the birds that still remained in the Central Valley to stay longer than usual. In Northeastern California cackling, snow, and white-fronted geese stayed well into May. The first part of June found 30 white-fronted geese and 40 snow geese still present at Tule Lake. Canada geese started nesting about two weeks later than usual, with the first broods appearing after the middle of April.

### Scope and Methods

Fundamentally the survey consists of an aerial census of the pairs of ducks present on the breeding grounds during the last half of May and the first half of June. Production is based on the number of pairs found, the relative nesting success, and the average brood size on each area. The latter two factors require considerable ground work and it is not always possible to conduct such surveys on each unit every year. An attempt is made to keep the data current on major areas.

Goose production in California is confined to the northeastern section and involves only Canada geese. Since the goose nesting season is over when the regular survey flights are made in June, a special survey was made in early May to record the number of breeding pairs. The June survey was then used to determine production and fall populations.

Insofar as possible the areas covered, census routes traveled, and methods employed have been duplicated from the pattern established in previous years. Census flights were made with a pilot and two observers. On some flights a different observer was used than in previous years, but in all cases at least one of the observers had flown the census route before.

All of the aerial transects were flown at elevations of 150 feet at speeds of 85 to 90 miles per hour with the two observers covering a ground strip one-eighth mile wide on either side of the airplane. Under these conditions experienced observers can accurately record species and sex of those ducks exhibiting divergent sex characteristics as well as note whether the birds occurred as pairs, singles, or groups of males. To obtain more complete information on Canada geese, in 1954 and 1955 an early flight (May 1 to 10) was made in Northeastern California to record the number of breeding pairs, singles, and groups (non-breeders) for this species.

### Results

For the following areas comparable data have been gathered in all four years. A standard pattern of reporting has been used to include pertinent facts with reference to individual areas. On a sampling basis, coverage of the entire State production can be considered as essentially complete; thus figures are shown as actual numerical estimates of total numbers rather than as ducks per square mile, etc. Data on individual areas studied are summarized with such remarks as are pertinent. "Total fall population" includes resident adults plus locally reared young.

#### 1. Sacramento Valley

- a. Area - 2400 square miles.
- b. Type - Agricultural land including 290,000 acres of rice, plus managed refuges and gun clubs.
- c. Coverage - 4-1/2 percent aerial in 1952, 2-1/2 percent in 1953 to 1955.
- d. Production summary:

Species	Estimated Total Nesting Pairs				Fall Population Indices			
	1952	1953	1954	1955	1952	1953	1954	1955
Mallard	34,300	25,930	20,240	22,320	171,500	90,750	86,020	93,210
Pintail	300	200	80	200	1,500	700	340	730
Gadwall	600	600	280	280	3,000	2,100	1,190	1,400
Cinn. Teal	1,700	1,160	520	920	8,500	4,060	2,210	3,020
Redhead	60	70	40	0	300	240	170	0
Ruddy Duck	0	0	40	0	0	0	170	0
Shoveler	40	240	40	0	200	840	170	0
Others	0	0	10	0	0	0	40	0
Total	37,000	28,200	21,250	23,720	185,000	98,690	90,310	93,360
Coots	4,500	8,080	8,240	4,760	22,500	28,280	41,200	21,930

- e. Remarks - This area shows an increase of 12 percent in nesting pairs of ducks and a three percent increase in the fall population. The number of breeding coots decreased 43 percent, and the fall population showed a decrease of 44 percent.

#### 2. Suisun Marsh

- a. Area - 140 square miles.
- b. Type - Natural tidal marsh, gun clubs and agricultural land.
- c. Coverage - Five percent aerial transect.
- d. Production summary:

Species	Estimated Total Nesting Prs.				Fall Population Indices			
	1952	1953	1954	1955	1952	1953	1954	1955
Mallard	3,640	1,400	500	660	18,100	7,000	2,480	2,740
Gadwall	480	200	100	140	2,500	1,000	500	690
Cinn. Teal	580	100	100	140	2,900	460	480	520
Others	180	140	90	60	900	700	450	300
Total	4,880	1,840	790	1,000	24,400	9,160	3,910	4,250
Coots	180	120	100	400	900	600	500	1,840

e. Remarks: Figures this year indicate a 27 percent increase in breeding ducks and a nine percent increase in the fall population. Breeding coots increased 300 percent while the fall population showed a 268 percent increase.

### 3. North San Francisco Bay

a. Area - 30 square miles.

b. Type - Tidal saltmarsh, gun clubs, river delta pasture land.

c. Coverage - 15 percent aerial transect.

d. Production summary:

Species	Estimated Total Nesting Prs.				Fall Population Indices			
	1952	1953	1954	1955	1952	1953	1954	1955
Mallard	480	440	400	80	2,400	2,200	2,000	330
Pintail	30	140	20	0	150	700	100	0
Gadwall	130	90	140	10	650	470	700	40
Cinn. Teal	30	10	30	10	150	30	150	40
Ruddy Duck	60	90	120	0	300	270	600	0
Shoveler	10	30	50	20	50	150	290	80
Others	110	80	0	10	550	240	0	40
Total	850	880	760	130	4,250	4,060	3,840	530
Coots	0	250	420	140	0	1,250	2,100	640

e. Remarks: This area shows a considerable decrease in both ducks and coots. The loss of waterfowl habitat due to the development of salt evaporation ponds is probably causing this decrease. Breeding ducks decreased 83 percent and the fall population declined 86 percent. Nesting coots decreased 67 percent and the fall population was down 70 percent.

4. North San Joaquin Valley (Grasslands)

- a. Area - 150 square miles.
- b. Type - Gun clubs and flooded pasture lands.
- c. Coverage - 25 percent aerial transect.
- d. Production summary:

Species	Estimated Total Nesting Pairs				Fall Population Indices			
	1952	1953	1954	1955	1952	1953	1954	1955
Mallard	2,070	1,420	2,170	750	10,350	4,420	6,950	2,440
Pintail	30	80	105	40	150	330	290	120
Gadwall	280	180	310	130	1,400	570	870	410
Cinn. Teal	340	180	235	190	1,700	620	530	600
Redhead	20	60	25	40	100	190	80	130
Ruddy Duck	0	30	20	50	0	100	60	140
Shoveler	50	200	10	120	250	640	30	380
F. T. Duck	0	0	5	0	0	0	20	0
Others	0	0	0	10	0	0	0	30
Total	2,790	2,150	2,880	1,330	13,950	6,870	8,830	4,250
Coots	960	3,900	250	530	4,800	10,770	1,370	2,890

e. Remarks: A decrease of 54 percent was recorded for breed-  
ducks while the fall population was down 52  
percent. Breeding coots and the resulting fall  
population doubled in numbers over 1954.

5. San Joaquin Valley

- a. Area - Not determined.
- b. Type - Flooded lake bottoms, river channels and agricultural land.
- c. Coverage - Aerial - Variable (10 percent to complete coverage).
- d. Production summary:

Species	Estimated Total Nesting Pairs				Fall Population Indices	
	1952	1953	1954	1955	1954	1955
Mallard	1,700	2,570	2,935	2,670	8,100	7,370
Pintail	40	190	80	40	220	110
Gadwall	290	50	160	120	440	340
Cinn. Teal	190	200	220	290	610	800
Redhead	70	30	50	30	140	80
Ruddy Duck	0	140	5	130	20	360
Shoveler	10	30	30	90	80	250
F. T. Duck	20	10	5	30	20	80
Others	0	0	0	0	0	0
Total	2,320	3,220	3,485	3,400	9,630	9,390
Coots	2,600	4,700	400	780	2,000	4,180

e. Remarks: The number of breeding ducks and the fall population remained relatively the same. Breeding coots increased 95 percent while the fall population increased 109 percent. Waterfowl habitat consists of rice land from Dos Palos to Helm and pasture land east of the San Joaquin River in Merced and Madera Counties.

#### 6. Northeastern California

- a. Area - Not determined.
- b. Type - Natural marshes, lakes and artificial impoundments.
- c. Coverage - Aerial, complete.
- d. Production summary:

Species	Estimated Total Nesting Pairs				Fall Population Indices			
	1952	1953	1954	1955	1952	1953	1954	1955
C. Goose	2,560	2,300	2,570	2,440	14,200	12,830	14,300*	11,060**
Mallard	7,120	5,430	5,410	5,160	50,980	32,620	38,800	33,540
Pintail	2,440	1,130	1,280	630	16,230	6,380	8,200	3,630
Gadwall	820	710	610	510	6,810	4,710	5,000	4,020
C. Teal	770	630	640	480	4,840	4,130	4,500	3,120
Redhead	430	700	710	430	2,410	5,200	5,400	3,060
Ruddy	100	190	180	140	440	1,260	1,100	810
Shoveler	250	140	230	40	1,880	630	1,500	250
Scaup	140	130	60	70	1,010	1,040	400	440
Others	150	230	160	70	800	1,230	800	350
Total	12,220	9,290	9,280	7,530	85,400	57,200	65,700	49,220
Coots	1,650	3,600	2,800	2,000	9,770	21,050	16,800	12,000

\* Includes 4,790 non-breeders.

\*\* Includes 3,560 non-breeders.

e. Remarks: This important area showed a five percent decrease in breeding Canada geese and a 22 percent decrease in the fall population. Breeding ducks declined 19 percent while the fall population decreased 25 percent. Coots showed a 29 percent decrease both in the breeding and fall populations. Dry conditions contributed considerably to the general decrease, especially at Grasshopper Valley, Horse Lake, Honey Lake, and Surprise Valley. Cold weather and snow storms during April also contributed heavily to the low production of Canada geese.

7. Klamath Basin (Tule Lake, Clear Lake, and Lower Klamath Refuges).

- Area - 35,000 acres of water and marsh plus surrounding agricultural lands.
- Type - Great Basin. Natural and managed marsh area.
- Coverage - Ground and aerial.
- Production summary:

Species	Estimated Total Nesting Pairs				Fall Population Indices			
	1952	1953	1954	1955	1952	1953	1954	1955
C. Goose	640	550	725	430	5,040	4,730	6,770	3,750*
Mallard	2,270	3,190	4,040	2,860	18,600	20,000	30,670	25,730
Pintail	440	360	810	350	3,230	2,000	5,090	3,120
Gadwall	3,200	4,210	3,850	1,960	27,200	45,800	33,530	17,500
C. Teal	1,210	1,165	1,950	2,530	9,100	8,640	13,990	22,570
Redhead	2,800	2,900	5,580	3,720	22,100	28,930	47,510	32,540
Ruddy	1,350	1,500	2,860	2,670	8,600	8,100	21,410	18,230
Shoveler	760	285	450	260	6,080	1,370	3,340	2,340
Scaup	150	105	90	110	1,230	620	870	1,040
Others	120	75	220	10	850	540	1,120	50
Total	12,300	13,790	19,850	14,470	96,990	116,000	157,530	123,120
Coots	3,900	4,500	3,900	3,450	24,000	27,300	30,500	16,000

\* Includes 1,250 non-breeders on Clear Lake (aerial count).

e. Remarks: Breeding Canada geese decreased 41 percent and the fall population was down 45 percent. Pairs of breeding ducks decreased 27 percent while the fall population declined 22 percent. Breeding coots showed a decrease of 12 percent and the fall population was down 48 percent.

#### 8. State-wide Trend.

A comparative summary of nesting pairs of waterfowl for the past four seasons together with final fall population including young plus resident adults is shown in the following table. These figures for each year have been derived from the preceding tables. In almost all cases the figures shown for "nesting pairs" are more accurate than those indicating "fall population indices."

Species	Estimated Total Nesting Pairs				Fall Population Indices			
	1952	1953	1954	1955	1952	1953	1954	1955
C. Goose	3,200	2,850	3,305	2,870	19,240	17,562	21,070	14,810
Mallard	51,580	40,380	35,695	34,500	271,930	156,990	175,020	165,360
Pintail	3,280	2,100	2,375	1,260	21,260	10,110	14,240	7,710
Gadwall	5,800	6,040	5,450	3,150	41,560	54,650	42,230	24,400
Cinn. Teal	4,790	3,435	3,695	4,560	27,040	17,910	22,470	30,670
Redhead	3,380	3,760	6,405	4,220	24,810	34,560	53,300	35,810
Ruddy	1,510	1,950	3,225	2,990	9,340	9,730	23,360	19,540
Shoveler	1,120	925	810	530	8,460	3,630	5,410	3,300
Scaup	290	235	150	180	2,240	1,680	1,270	1,480
Others	610	545	490	190	3,250	2,740	2,450	850
Total	72,369	59,370	58,295	51,580	409,890	292,000	339,750	289,120
Coots	13,790	25,150	16,110	8,610	61,970	89,250	94,470	43,480

The accumulated data indicates that the Canada goose breeding population was down 13 percent, while the fall population decreased 30 percent from 1954. During the past five years an attempt has been made to determine what portion of the fall population was comprised of adult breeders, non-breeders, and young of the year. The past two years a special flight was made early in May to tally the number of breeding pairs and non-breeders. Pairs, singles, and groups were tabulated separately. These figures were then compared with the counts made during the regular breeding ground flight early in June when the geese were recorded as adults with young, young, and groups of adults without young (non-breeders and unsuccessful breeders).

#### Canada Goose Population in California, 1955

Area	Breeding Pairs	Young Produced	Non-Breeders	Fall Population Indices
Northeastern Calif.	2,440	2,620	3,560	11,060
Klamath Basin	430	1,640	1,250	3,750
Total	2,870	4,260	4,810	14,810

The figures given in the above table are not complete as geese in some areas (non-breeders and unsuccessful breeders) move into adjoining states to molt, and are not in California when the June census is made. Two out-of-state areas that attract geese are upper Klamath Lake in Oregon and Pyramid Lake in Nevada. Another source for error is the movement of geese from Oregon into the Goose Lake area. These interstate movements point out the need for managing these birds on an ecological area basis instead of a geographical basis.

The breeding duck population showed a 12 percent decrease while the fall population was 15 percent below 1954.

The nesting coot population was down 47 percent while the fall population was 54 percent below last year.

#### Banding

During the summer and fall 18,489 ducks, 2,829 Canada geese and 406 coots were banded on seven major waterfowl areas prior to September 15. Species, sex and age data are presented in the following table:

Table I. - California Waterfowl Banding Summary, June 15 - September 15, 1955.

Species	Adult Males	Immature Males	Adult Females	Immature Females	Unclassified Immature	Other	Total
Mallard	1,453	923	891	552	-	-	3,819
Gadwall	-	143	3	154	-	-	300
Pintail	3,699	5,031	1,027	3,618	-	-	13,375
G-w. Teal	64	89	4	30	-	-	187
Cinn. Teal	12	251	32	173	-	-	468
Redhead	7	103	33	94	-	-	237
Other Ducks	22	31	22	28	-	-	103
Coots	-	-	-	-	25	381	406
C. Goose	1,112	-	1,114	-	603	-	2,829

#### Nesting Studies

This year an extensive nesting study was conducted in the Sacramento Valley with the object of bringing the basic production data for this area up to date. A total of nine study plots scattered throughout the production area was covered. Nesting success has decreased somewhat in the past five years.

Table II. - Nesting Success in Sacramento Valley, 1955.

Species	Total Nests Located	Destroyed	Deserted	Hatched
Mallard	304	53%	9%	38%
Gadwall	6	33%	17%	50%
Cinnamon Teal	23	48%	17%	35%
Total Ducks	333	52%	9%	39%
Coots	105	54%	5%	41%

Wood Duck Study

The nesting habitat of the wood duck has been greatly reduced by agricultural development, but small populations still exist in scattered locations. Due to their seclusive habits during the nesting season the full extent of the breeding population is not known. A wood duck box survey was started in 1952 to determine the probable success or feasibility of a large scale program of erecting nesting boxes, and to learn more of the local distribution of this species in California. To date approximately 150 boxes have been erected throughout the northern part of the State.

Table III. - Wood Duck Nesting Box Usage, 1952-1955.

	1952	1953	1954	1955
Total Boxes	11	51	149	142
Total Boxes Functional	10	50	129	121
Percent of Boxes Used by Wood Ducks (Includes Boxes with Double Usage)	40%	36%	30%	39%
Percent of Success in Boxes Used	75%	61%	82%	89%
Average Clutch in Successful Nests	12	14.4	14.1	12.3
Total Young Leaving Boxes	36	122	335	424

## WATERFOWL BREEDING GROUND SURVEY IN NEVADA, 1955

C. Vic Oglesby

### Introduction

The waterfowl breeding ground survey conducted by the Nevada Fish and Game Commission in 1955 represents the fifth consecutive year of production studies in this State.

This survey has been expanded throughout the five-year period to include the majority of waterfowl breeding habitat found mostly in west-central and northeastern Nevada. Other areas of the State are, for the most part, insignificant insofar as waterfowl production is concerned. More efficient coverage of all areas is anticipated with the progress of Nevada's newly established fish and game management districts.

Because of severe drought conditions, comparative data is not available for some areas included in last year's survey.

All field work was carried on by Pittman-Robertson personnel of the Nevada Fish and Game Commission with LeRoy Giles, U. S. Fish and Wildlife Service biologist, contributing data for the Stillwater Wildlife Management Area.

### Methods

Procedure for studies made this year did not vary from the pattern established in the past, that is, all key sample areas are checked either by boat, car or on foot at least two or three times during the period. To date, no aerial transects have been established to estimate breeding pairs.

### Weather and Water Conditions

Available water in all trend areas was drastically reduced due to a poor winter snow pack. Water supplies for west-central Nevada were about 70 percent of normal and were considerably less than this in the northeastern section of the State.

Because of drought conditions in northern Nevada, the Humboldt-Toulon Sink and Franklin Lake contributed little or nothing to this year's production. Both of these areas are very good producers when water conditions are near normal.

Wind, rain and snow continued throughout May and early June and delayed nesting activities in most sections.

Production

Production on the reservoir trend areas in northern Nevada amounted to very little this year. Severe drought conditions resulted in the drying up of most reservoirs by late summer. Water levels were low at the start of the breeding season and had receded to pothole proportions too far isolated from available cover to offer attractive nesting sites before the nesting season was very far along. This condition, which prevailed last year as well, resulted in a 47 percent decrease in the number of young observed on the reservoir trend areas compared to last year. For the past two years of drought conditions, production has dropped on these areas 90 percent from the 1953 level.

Ruby Lake National Wildlife Refuge reports near normal water conditions and a slight increase in production over last year.

Table I. - Totals of All Brood Classes by Species on Reservoir Trend Areas  
For Comparative Periods, 1954-1955.

Species	Broods		Young		Average	
	1954	1955	1954	1955	1954	1955
Mallard	12	15	77	88	6.4	5.8
Pintail	9	3	37	17	4.1	5.7
Gadwall	15	5	93	33	6.2	6.6
Cinnamon Teal	8	-	51	-	6.3	-
Green-winged Teal	3	1	12	5	4.0	5.0
Total	47	24	270	143	5.7	5.9

Table I shows a 47 percent decrease in number of young and a 48 percent decrease in number of broods observed on the reservoir trend areas compared to 1954.

On the Stillwater Wildlife Management Area duck production has increased about nine percent and production of Canada geese has nearly doubled. Noticeable increases occurred in numbers of mallard, cinnamon teal, redhead and ruddy ducks. Production of gadwall, baldpate, pintail and shovellers has declined. In the remainder of west-central Nevada production has dropped about 50 percent from last year.

Table II. - Nesting Pair Count for Stillwater Wildlife Management Area, 1954-1955.

<u>Species</u>	<u>1954</u>	<u>1955</u>
Canada Goose	21	34
Mallard	430	511
Gadwall	358	222
Baldpate	4	6
Pintail	105	22
Green-winged Teal	9	-
Cinnamon Teal	858	1211
Shoveler	50	11
Redhead	1262	1658
Ruddy Duck	134	244
 Total	3210	3885
Coot	3700	2800

Table III. - Estimated Waterfowl Production on the Stillwater Wildlife Management Area, 1954-1955.

<u>Species</u>	<u>1954</u>	<u>1955</u>
Canada Goose	48	85
Mallard	1996	2403
Gadwall	1826	1144
Baldpate	17	23
Pintail	461	93
Green-winged Teal	45	-
Cinnamon Teal	4243	5018
Shoveler	226	49
Redhead	5868	6144
Ruddy	496	818
 Total	15178	15777
Coot	10080	6692

Goose Production

Goose production showed a decrease of 61 percent in the Washoe Lake area compared to last year's figures. A total of 20 broods was recorded in this area totaling 126 young for an average size of 6.3 geese. This is noticeably higher than last year's average of 4.9 and considerably higher than the national average. Low water levels almost completely reduced the attractive nesting islands used in the past in this area and the birds were forced to nest in the less desirable meadow land surrounding the lake. The population of non-breeding, molting Canada geese at Pyramid Lake showed an increase of nearly 40 percent over last year's total of 2,450 geese. The increased use of molting geese at Pyramid Lake is probably due to a decrease in nesting birds at Honey Lake, Washoe Lake and other surrounding nesting areas.

Banding Summary

Species	AM	IM	AF	IF	Loc. M	Unclass-		Total
						Loc. F	Ified	
Mallard	--	6	5	3	--	--	--	14
Pintail	85	74	89	65	--	--	--	313
G-w. Teal	34	31	6	19	--	--	--	90
Cinn. Teal	--	4	1	4	--	--	--	9
Shoveler	6	1	1	1	--	--	--	9
Baldpate	1	--	--	--	--	--	--	1
Redhead	--	--	--	1	2	--	--	3
Ruddy Duck	--	2	--	3	--	--	--	5
Total	126	118	102	96	2	--	--	444
Canada Goose	69	3	72	--	19	10	--	173

Summary

1. Drought conditions during the past two years have seriously reduced nesting habitat.
2. Stormy weather during the early breeding season retarded nesting two to three weeks.
3. Waterfowl production is about 50 percent of last year's total.
4. A total of 444 ducks and 173 geese was banded during the pre-season period.

## WATERFOWL BREEDING GROUND SURVEY IN IDAHO, 1955

Robert L. Salter

### Introduction

Most of the data presented here were gathered under Federal Aid Project 96-R-6 with biologists Charles S. Blake, Edwood G. Bizeau, Charles D. Haynes, Jr. and Hugh A. Harper, Jr., responsible for the collection of material in Districts 4, 5, 3, and 1 and 2, respectively. Mr. F. Sheldon Dart, Refuge Manager, Deer Flat National Wildlife Refuge, again cooperated in conducting the Homedale goose nesting and banding work. Mr. C. G. Wolf, Refuge Manager, Minidoka National Wildlife Refuge, assisted in the goose banding at the refuge. Mr. Newell Morgan, Refuge Manager, Camas National Wildlife Refuge, participated in the brood counts taken on the refuge. Mr. James S. Cromwell, Game Management Agent, assisted in the Homedale banding work. Many Idaho Fish and Game Department employees, including conservation officers, refuge managers and biologists, cooperated in the banding and brood count work.

### Weather and Water Conditions

The average temperatures over the State in March and April were the second lowest on record. May was also a cold month with the largest snowfall average ever recorded. June had nearly normal precipitation and temperatures and July was about average except for excessive rainfall in the northern part of the State. The average temperature for the State for August was above normal for the first time since last December. Many reservoirs in southern Idaho were at below normal levels by the end of summer.

Nesting in most areas was delayed about two weeks from last year. Inclement weather in the form of snow storms apparently affected goose nesting success on Island Park Reservoir.

### Migration

The 1955 winter inventory showed 13 percent fewer waterfowl in the State this year than last. This was believed to be primarily due to the fact that more of the water areas had frozen and the birds had been forced on south. The spring migration of waterfowl passed through the State in apparently normal numbers. There were no large buildups in any areas and the bulk of the birds were in evidence during the last two weeks of March and the first week in April.

### Goose Survey

This year for the first time an aerial reconnaissance was made of all major goose producing areas in the State. The primary objective was to determine the relative importance of each area by making breeding pair counts.

Counts were taken from light planes and each area was covered thoroughly. In some areas it was possible to tally birds as pairs, singles and groups. When heavy nesting concentrations were encountered it was not possible to make this breakdown and the pairs were counted, singles were counted as pairs and groups were recorded as such. The results of the counts are given in Table I. In this table the "pairs" column includes the singles recorded as pairs.

### Goose Nesting Study

Canada goose nesting surveys were continued in several areas of the State. In some localities this makes the fourth year in which comparable data has been gathered. Survey methods are similar in all areas and consist of one search to locate nests and one re-check to determine nest success. The degree of coverage varies somewhat in each area but it is believed that from 85-100 percent of the nests are located in this manner. The results of this year's survey are given in Table II.

A comparison of the estimated goose production from these areas based on the nesting studies is given in Table III. These production figures do not indicate total estimated production. They show population trends based on the number and hatching success of nests found on the same areas covered in the same manner each year. On this basis, the estimated production on four areas with trend data for four years is down approximately 30 percent. The greatest production declines were noted in the Homedale and Island Park areas. The big decline in the Homedale unit was due primarily to fewer nests being found, with a lower nest success than last year also contributing to the reduction. Several snow storms in late May seriously affected the hatch in Island Park with a corresponding drop in this year's goose crop. The estimated production on the four areas with the longest nesting records was just slightly above that of 1952, the first year of the study.

### Brood Trend Routes

Duck brood production trend routes were run in Districts 4 and 5. These routes were covered in early July and all broods recorded. In late July they were run again and only Class I broods were counted. The results of this year's counts and comparisons with previous counts are given in Tables IV. and VI. It is believed that the decline in the number of broods counted in District 5 this year was partially due to the delay in duck nesting. No doubt a number of nests were brought off after the second count since 82 percent of all broods recorded

during this count were Class I size. In District 4 an attempt has been made to correlate aerial counts of breeding pairs and brood trend route counts. This comparison is shown in Table V. On these routes in 1954, broods were observed for 65 (64 percent) of the 103 pairs counted in the aerial survey. In 1955, broods were observed for 59 (63 percent) of the 94 breeding pairs recorded.

The results of all brood counts taken in the State are given in Table VII.

#### Banding

In the Canada goose banding program this year, emphasis was again placed on catching as many "locals" as possible. The results are shown in Table VIII.

Table I. - Idaho Canada Goose Aerial Count, 1955.

Area	Pairs	Groups	Total
<b>Snake River Drainage</b>			
Farewell Bend to R. R. bridge	460	248	1,168
Payette River (mouth of Emmett)	110	41	261
Strike Dam to American Falls Dam	95	77	267
American Falls Dam to Wyoming line via South Fork	71	36	178
North Fork including Henry's Lake and Island Park	43	185	271
Teton River (South Fork)	22	12	56
Mud Lake-Camas National Wildlife Refuge	96	28	220
Gray's Lake	124	43	291
Blackfoot Reservoir	54	198	306
Miscellaneous	14	-	28
<b>Bear River Drainage</b>			
Dingle Swamp Area	171	132	474
Bear River (Dingle to Utah line)	16	-	32
Deep Creek (Oxford Sloughs)	14	3	31
<b>Total</b>	<b>1,290</b>	<b>1,003</b>	<b>3,583</b>

Table II. - Results of Canada Goose Nesting Survey in Idaho, 1955.

	Glenns Ferry	Homedale	Blackfoot Reservoir	Island Pk. Reservoir	North Fork Snake River	North Lake	Total
No. of Nests Found	16	189	117	34	32	31	419
No. of Nests Terminated	16	189	117	34	32	31	419
No. of Successful Nests	1(6.3%)	125(66.1%)	81(69%)	19(56%)	21(66%)	26(84%)	273(65.2%)
No. of Unsuccessful Nests	15(93.7%)	64(33.9%)	36(31%)	15(44%)	11(34%)	5(16%)	146(34.8%)
Avg. Clutch - Successful Nests	4.0	5.1	5.1	3.7	4.7	5.2	5.0
Avg. Hatch - Successful Nests	4.0	4.8	4.8	2.7	4.5	5.2	4.7

Table III. - Comparison of Goose Production on Idaho Survey Areas, 1952-1955.

	Glenns Ferry	Homedale	Blackfoot Reservoir	Island Pk. Reservoir	North Fork Snake River	North Lake	Total*
No. of Nests Found							
1952	24	208	103	16	-	-	351
1953	24	250	121	44	-	-	439
1954	34	216	132	42	39	24	424(487)*
1955	16	189	117	34	32	31	356(419)
No. of Nests Hatched							
1952	16	103	75	12	-	-	206
1953	11	180	74	36	-	-	301
1954	9	169	78	36	34	19	292(345)
1955	1	125	81	19	21	26	226(273)
Average Hatch							
1952	5.1	4.7	4.7	4.0	-	-	4.7
1953	5.4	5.0	4.8	4.6	-	-	4.9
1954	4.6	5.5	4.5	4.1	4.8	4.4	5.1(5.0)
1955	4.0	4.8	4.8	2.7	4.5	5.2	4.6(4.7)

Continued

Table III. Continued

	Glenns Ferry	Homedale	Blackfoot Reservoir	Island Pk. Reservoir	Snake River	North Fork	North Lake	Total*
<b>Estimated Production</b>								
1952	82	484	352	48	-	-	-	966
1953	60	900	355	166	-	-	-	1481
1954	41	930	351	148	154	80	1470(1704)	
1955	4	601	387	52	94	130	1044(1268)	

\* Excluding North Fork and North Lake

()\* Including North Fork and North Lake

Table IV. - Brood Count Trend Routes - District Four, 1954-1955.

Trend Route	Year	Number of Broods by Species								Total
		Mallard	Redhead	Gadwall	B-w/Cinn.	Teal	G-w. Teal	Pintail	Baldpate	
Milner Canal	1953	25	-	-	-	-	-	2	2	-
	1954	18	1	-	-	-	-	-	-	19
	1955	25	1	-	-	-	1	-	-	27
Minnidoka - Burley	1953	4	40	3	-	-	-	-	-	50
	1954	4	9	8	-	-	-	-	-	21
	1955	14	4	8	-	-	4	-	-	30
Richfield - Canal	1954	16	-	1	-	-	-	3	-	20
	1955	14	-	-	2	-	-	7	-	23
By Pass Canal	1954	18	-	1	-	-	-	5	-	24
	1955	9	-	1	-	-	-	6	-	16
Total	1954	56	10	10	-	-	-	8	-	84
	1955	62	5	9	2	5	-	13	-	96

Table V. - Comparison of Breeding Pair and Brood Counts - District Four - 1955.

Trend Route	B-w. &									
	Mallard Prs. Brs.	Baldpate Prs. Brds.	Gadwall Prs. Brds.	Cinn. Prs. Brds.	Teal Prs. Brds.	G-w. Teal Prs. Brds.	Redhead Prs. Brds.	Pintail Prs. Brds.		
Milner Canal	28	19	4	-	-	-	1	-	9	1
Richfield Canal	12	14	10	7	2	-	1	2	1	-
ByPass Canal	12	9	10	6	2	1	-	-	-	-
Total	52	42	24	13	4	1	1	2	2	-

Table VI. - Duck Brood Production Trend Routes - District Five, 1953-1955.

Trend Route	Year	G-w. B-w. &							Lesser				All Species Brood Total	
		Mallard	Pintail	Baldpate	Gadwall	Shoveler	teal	Cinn. T.	Canvas.	Redhead	Ruddy	Scaup	Unid.	
Camas	1953	9	4	1	7	1	1	1	-	17	9	4	9	63
NWR	1954	22	4	-	9	-	1	2	1	4	3	8	10	64
	1955	6	2	-	8	2	-	3	-	3	-	5	9	38
Camas	1953	11	16	9	3	3	1	-	-	13	-	2	3	61
Creek	1954	11	6	5	4	1	2	1	-	2	-	3	1	36
	1955	5	5	13	5	1	1	4	-	1	-	5	2	42
Teton	1953	7	-	7	1	-	1	2	-	6	-	-	2	26
River	1954	2	-	1	6	-	-	-	-	7	-	-	2	18
	1955	1	-	1	3	-	-	2	-	5	-	-	1	13
Blackfoot	1953	14	6	4	28	-	1	-	-	-	-	12	13	78
Reservoir	1954	14	4	4	33	-	1	5	-	5	-	8	4	78
	1955	12	2	6	23	-	1	7	-	3	-	6	5	65
Total	1953	41	26	21	39	4	4	3	-	36	9	18	27	228
All Routes	1954	49	14	10	52	1	4	8	1	18	3	19	17	196
	1955	24	9	20	39	3	2	16	-	12	-	16	17	158

Table VII. - Idaho Brood Counts - Summer, 1955.

Species	Class I			Class II			Class III		
	No. Broods	No. Young	Avg.	No. Broods	No. Young	Avg.	No. Broods	No. Young	Avg.
Mallard	111	769	6.9	68	413	6.1	53	292	5.5
Gadwall	48	347	7.2	14	97	6.9	5	28	5.6
Baldpate	"	227	7.3	6	33	5.5	2	11	5.5
B-w. & Cinn. Teal	24	160	6.7	7	59	8.4	9	56	6.2
Lesser Scaup	24	189	7.9	4	26	6.5	-	-	-
Redhead	19	123	6.5	4	23	5.8	2	7	3.5
Am. Goldeneye	15	90	6.0	2	14	7.0	-	-	-
Pintail	11	62	5.6	4	22	5.5	4	28	7.0
Green-winged Teal	10	69	6.9	1	7	7.0	1	9	9.0
Wood Duck	8	47	5.9	2	5	2.5	1	6	6.0
Ruddy Duck	5	32	6.4	2	10	5.0	-	-	-
Shoveler	4	31	7.8	1	6	6.0	-	-	-
Am. Merganser	4	17	4.3	-	-	-	-	-	-
Hooded Merganser	1	7	7.0	-	-	-	-	-	-
Canvasback	1	4	4.0	-	-	-	-	-	-
Total	316	2174	6.9	115	715	6.2	77	437	5.7
Averages									

Table VIII. - Idaho Banding Data - Summer, 1955, Canada Goose.

Species and Area	Male		Female		Uncl.	Total
	Adult	Local	Adult	Local		
Snake River, Homedale	8	105	7	103	-	223
Cascade Rservoir	3	4	-	2	-	9
Minnidoka NWR	15	3	8	11	-	37
North Lake Refuge	7	2	11	3	-	23
Blackfoot Reservoir	14	89	12	99	-	214
Island Park Reservoir	18	26	12	29	-	85
Deer Flat NWR	2	-	-	-	-	2
Hagerman Refuge	-	-	-	-	1	1
Total	67	229	50	247	1	594

## WATERFOWL BREEDING GROUND SURVEY- MONTANA

1955

Wynn Freeman

Introduction

In 1955 the Montana Fish and Game Department conducted their seventh annual breeding ground survey. The aerial survey for breeding populations was made in essentially the same manner as preceding years. Again ground surveys for species composition and nesting success was very limited because of lack of personnel.

The aerial surveys were conducted by Don Brown and Ralph Cooper (pilots), Wynn Freeman, Dale Witt, Dick Trueblood, Tom Hay, Robert Eng (observers), all of the Montana Fish and Game Department. Ground surveys were made by Dick Trueblood, Dale Witt, Robert Eng, Joe Egan, Merle Rognrud, and Dwight Stockstad.

Climatic Conditions

For the third consecutive year, Montana's winter has been marked by moderate weather conditions. Above-average temperatures and below-average precipitation prevailed from November through the month of January; ranges were generally free of snow cover until the middle of February. Heavy snowfalls during the month of April in the eastern and central hi-line regions resulted in a drastic reversal of the seasons trend. The Medicine Lake weather station reported a departure from normal precipitation of +2.60 inches whereas the Havre station in the central hi-line reported a departure from normal of +2.82 inches. The western piedmont region and the area west of the continental divide continued to receive below average precipitation for this period. Weather and water conditions have remained good to excellent in May, June, July and the first part of August throughout the major waterfowl producing areas of the State. Elmo Adams of the Medicine Lake National Wildlife Refuge had this to say about the Sheridan Moraine and the eastern hi-line (personal correspondence), "This year many small potholes in surrounding areas held water all through the summer and furnished nesting sites for a great many ducks. Since the potholes did not dry up the birds did not move into the refuge, as they usually do, until about September 1."

### Methods

The geological subdivisions of Montana as described in "Waterfowl Breeding Conditions in Montana for 1949" (Crissey and others<sup>1</sup>) were used as the basis for the surveys. The survey was begun as soon as it was determined that the spring migration was nearing completion.

The comparative results for 1953, 1954, and 1955 are shown in Tables I and II. The effect of early spring precipitation on water conditions at the start of the breeding season is illustrated in Table I. The increase in water areas of all types over the 1954 conditions was uniform throughout.

Generally speaking, the spring migration was less than last year in the important hi-line production areas east of the divide. Mr. Adams, Refuge Manager at Medicine Lake Refuge, says (communication dated June 21, 1955), "Spring migration was about 25 to 30 percent less than last year. However, there were lots of birds that went right on north without stopping so the number that stopped is no indication of the total flight." The same trend was noticeable just east of the Continental Divide at Freezout Lake, an important stop-over point during migration.

The 1955 breeding population trend census indicate a 17 percent decrease from the 1954 level and 15 percent increase over the six-year average (Table II). The areas sampled were identical with those flown in previous years with the exception of the Great Falls Piedmont, where data were not available for the sector from Shelby to the Divide. In the southern unglaciated prairie, a complete count on one strategically located trend area constitutes the determination of waterfowl conditions. Although the area is large, the waterfowl density is low. Stock water reservoirs contain the bulk of the available water. This area had a 42 percent decrease in waterfowl numbers from the 1955 level and a 29 percent decrease from the past three-year average.

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<sup>1</sup> Crissey and others, "Waterfowl Populations and Breeding Conditions - Summer 1949," Special Scientific Report: Wildlife No. 2, PP. 125-135.

Table I. - Comparative Numbers of Water Areas Observed Over the Same Routes During the 1953, 1954  
and 1955 Aerial Breeding Ground Survey.

Physiographic Area	Reservoirs			Potholes			Other			Total			% Change 1954 to 1955
	Per Sq. Mile 1953	1954	1955										
Eastern Hi-line	.20	.29	.33	.71	1.05	1.41	.81	.68	.51	1.71	2.03	2.25	+ 11
Central Hi-line	.64	.55	.76	1.45	3.18	3.75	.42	.48	.96	2.50	4.21	5.48	+ 30
Great Falls Piedmont (5 Strips)	.66	.81	.84	2.05	.94	1.69	.34	.38	.49	3.04	2.12	3.02	+ 42

Table II. - Waterfowl Populations as Determined From Aerial Census Routes.

Physiographic Area	Approximate Size of Area (Square Mi.)	No. of Sq. Mi. Sampled		No. of Ducks/Sq. Mile		Pop. Estimates	
		1954	1955	6 Yr. Avg.	1954	1955	1954
Sheridan County	1,440	33	33	27.4	48.2	39.3	69,408
Eastern Hi-line	7,920	171	171	5.1	6.7	6.4	53,064
Central Hi-line	9,468	101	101	10.9	16.7	15.0	158,115
Great Falls Piedmont	7,020	161	61	10.0	8.0	5.2	56,160
Total					336,747		285,804

## WATERFOWL BREEDING GROUND SURVEY IN UTAH

1955

Noland F. Nelson

### Introduction

The 1955 waterfowl breeding ground survey represents the seventh consecutive year such a survey has been conducted in Utah. The survey was expanded this year and now covers those areas which are known to contain the bulk of the waterfowl breeding populations of the State. Waterfowl are concentrated around the limited lakes, rivers, and irrigated areas of the State, as most of Utah is either mountains or desert. It is difficult to get accurate counts of ducks on these concentration areas, but it is hoped that aerial and ground counts will give general trends in the breeding populations.

Most of the data was secured by personnel of the Pittman-Robertson Division of the State Fish and Game Department. They were assisted on some sections of the survey by personnel of the Fish and Wildlife Service.

### Survey Methods

Aerial transect routes flown in 1955 followed the identical routes of permanent transects flown in 1954. All the aerial transects were flown at elevations of 200 feet at speeds of 75 to 80 miles per hour, with two observers covering a ground strip one-eighth mile wide on either side of the airplane. Most of the important breeding grounds of the State were covered by the aerial surveys.

Ground counts were used in place of aerial counts on the Sevier River and Cutler Reservoir areas. It was impossible to count the meandering streams of these areas by air. New areas for ground counts were established in Rich County and along the Sevier River. Air boats were used to count the Cutler Reservoir with apparent success. Intensive ground counts were also conducted on key State waterfowl refuges.

Due to the difficulty in counting duck broods in Utah in relation to the limited information gained, very little effort was directed toward duck brood counts. Brood counts were limited almost entirely to Canada geese. It is planned to establish several key areas for goose brood counts to reflect changes in the production of this species.

### Weather and Water Conditions

The spring run-off was below normal but above the drought conditions of 1954. Most reservoirs, ponds, and marshes had a fair supply of water.

Temperatures were far below normal, which delayed nesting of some species and reduced the hatching success of early nests of Canada geese and mallard.

#### Aerial Census

The aerial survey of 1955 covered the same routes and distance as the 1954 survey. Water conditions were good along all aerial routes. The following table gives a comparative summary of the results of the 1954 and 1955 surveys:

Table I. - Total Ducks Counted by Area and Square Mile as Determined from Aerial Surveys - 1954 and 1955.

Route	Sq. Mi. Sampled		Total Ducks Counted		Ducks/Sq. Mi.	
	1954	1955	1954	1955	1954	1955
Box Elder Co.	48.0	48.0	2,752	3,958	57.3	82.5
Weber Co.	15.5	15.5	1,100	1,390	70.9	89.6
Davis Co.	14.2	14.2	330	409	23.2	28.1
Jordan River Clubs	6.2	6.2	809	584	130.5	94.2
Salt Lake Co.	6.7	6.7	36	91	5.4	13.6
Utah Co.	18.0	18.0	211	380	11.7	21.2
Total	108.6	108.6	5,238	6,812	48.2	62.7

There was a 30 percent increase in the population of ducks along the aerial transect routes. All areas increased except the Jordan River Clubs.

Counts of the species of ducks along the transect routes indicated a large increase in the redhead population of the area. There was also an increase in the numbers of mallard counted. There was a decline in the count of Cinnamon Teal.

#### Ground Census

Ground counts on State waterfowl refuges indicated a slight decrease in the breeding population of these areas. There was a marked decline in Canada geese and cinnamon teal. The population of redheads increased on all areas. Construction activity forced the draining of some sections of the public shooting grounds and may have accounted for some reduction in the population of this area.

**Table II. - Estimate of Total Breeding Pairs on State Refuges from Dike Line**  
**Census - 1954 and 1955.**

<b>Species</b>	<b>Ogden Bay</b>		<b>Farmington Bay</b>		<b>Public Shoot-ing Grounds</b>	
	<b>1954</b>	<b>1955</b>	<b>1954</b>	<b>1955</b>	<b>1954</b>	<b>1955</b>
Canada Geese	120	63	75	43	12	8
Mallard	349	395	30	26	53	48
Gadwall	217	189	24	28	20	15
Pintail	218	214	24	42	10	8
Cinnamon Teal	747	515	190	105	105	75
Redhead	261	426	80	126	156	114
Shoveler	138	157	42	38	15	12
Green-winged Teal	6	12	-	1	-	2
Blue-winged Teal	30	26	4	1	2	1
Ruddy Duck	70	74	23	25	4	6
Total	2,156	2,071	492	435	376	289

Ground counts were started on several new areas in 1955. There has been no previous census on these areas but the general population appeared to be above last year. Flocks of birds were not included in the counts on these areas, as they were quite common and appeared to be non-breeders. The areas listed in the following table will be counted again next year to establish trends in the breeding population of these sections.

**Table III. - Ground Counts of Breeding Populations in Selected Areas of Cache, Rich, and Central Utah Counties - 1955.**

<b>Area</b>	<b>Lone Males</b>	<b>Pairs</b>
Round Valley	15	38
Little Blue Grass	7	26
Blue Grass Lake	22	67
Lower Sevier Lakes	10	54
Gunnison Bend Reservoir	2	20
Scipio Lake	1	20
Fool's Creek Reservoir	1	10
Redmond Lake	4	32
Olsen's Slough	2	24
Sevier River (Lost Creek Area)	2	12
Rocky Ford Reservoir	-	13
Cutler Reservoir	92*	121*

\* Airboats were used for this count.

Brood Counts

An effort was made to make counts of goose broods over most of the State. Populations were known to be in several areas but could not be counted. There were also more broods known on some of the areas listed in the following table, but only birds actually seen were listed.

Table IV. - Counts of Canada Goose Broods - 1955.

Area	Broods	Young	% Change
Public Shooting	7	29	- 32
Bear River Refuge and Vicinity	230	1,150	- 30
Ogden Bay Refuge	56	240	- 42
Syracuse	2	11	?
Farmington Bay	36	162	- 15
Harrison Gun Club	7	37	?
Cutler Reservoir	16	82	+ 12
Round Valley	8	40	?
Strawberry Reservoir	1	5	?
Stewart's Lake	7	38	None
Otter Creek Slough (Rich)	21	112	?
Scipio Lake	1	8	?
Fool's Creek Reservoir	2	12	?
Redmond Lake	5	30	?
Gunnison Reservoir	23	102	?
Clear Lake Refuge	4	17	+100

Most of the major goose producing area of the State showed a marked decline in the production of birds. Nesting success was apparently good despite inclement weather, but there was a lack of breeding adults.

Summary

1. The 1955 breeding ground survey followed the same aerial transect routes and there was an increase in the area covered by ground counts.
2. Water conditions were good but low temperatures prevailed during the early part of the nesting season.
3. Aerial counts indicated a 30 percent increase in the breeding population of ducks on the major waterfowl areas of the State.
4. Ground counts indicated a slight decrease in population on State refuges. There were marked declines in the population of Canada geese and a

marked increase in the population of redheads.

5. Brood counts indicate a drastic decline in the production of Canada geese on the major goose producing areas of Utah.

## WATERFOWL BREEDING GROUND SURVEY IN WYOMING, 1955

Robert M. Ballou  
and  
George F. Wrakestraw

### Introduction

With the objective of achieving an accurate index to the duck breeding population in the more important waterfowl habitat in Wyoming, permanent random sample areas were selected by the Statistics Department of the University of Wyoming. The sample plots were flown for ducks by project personnel and results analyzed by the University. The Canada goose inventory was conducted in the same manner as in past years.

### Methods

As in 1954 the duck breeding ground survey this year was based entirely upon breeding pair counts. No organized brood surveys were made. Sample plots of varying size, totalling 2,239 square miles, were randomly selected from all of the potential waterfowl habitat within the State accessible to a plane--a total of 54,249 square miles, approximately one-half of the total State area. Yellowstone National Park and the National Forests were excluded from the sampled area, as were known desert areas of little waterfowl value. No stratification of the sample area was attempted. All sample plots were bounded by roads, streams, or hydrographic divides for ease of location, accuracy, and future reference. Sample areas were flown during the last half of May and duck counts taken by the observer and pilot.

To derive a correction factor for the aerial inventory, ground crews thoroughly covered 22.7 square miles of representative portions of certain aerial sample plots throughout the State immediately following the aerial census. The correction factor was used on the aerial data to obtain the total State population index.

All of the known Canada goose breeding habitat was again flown this year in early May to obtain a total State breeding population.

### Weather and Water Conditions

Wyoming experienced a late spring this year, delaying the breeding season to some extent throughout the State, and as much as three to four weeks in some areas. The prolonged cold weather may have had an adverse effect upon early nesting birds.

Water conditions have remained sub-normal in the western two thirds of the State. Despite early spring snows and later rains, the water content in the snow pack was below average, run-off was reduced, and water levels in reservoirs and stock ponds sub-normal.

The eastern third of Wyoming, with few local exceptions, had an abundance of water areas this spring as a result of timely snow falls. Later rains have maintained a majority of the water areas in good condition. This portion of the State has received more moisture during the first six months of the year than has been recorded since the commencement of the current drouth, and Sheridan, Johnson, and Goshen Counties have had near record snow and rainfalls during the spring and early summer.

#### Summary

Table I presents a summary of the duck breeding ground survey prepared by the Statistics Department of the University of Wyoming. Figures given represent corrected totals.

No comparison of results can be made with previous years' surveys, but use of essentially the same sample areas in the future should provide a basis for comparison. General impressions, however, indicate that there were a great many more breeding ducks in the stock pond area in the eastern third of Wyoming than in 1954, whereas it is believed the remainder of the State held fewer birds.

Although no organized brood survey has been taken, the brood banding crew in the eastern third of the State has found far fewer ducks and broods in mid-July than was anticipated as a result of the high breeding population encountered in late May. Many of the birds may have moved into Canada for the actual breeding period.

Table II presents the results of the complete aerial coverage of Canada goose habitat in early May. A correction factor of 1.76 (derived from a nesting study on the Green River in 1954) has been applied to the data in Table II to show in Table III what is believed to more nearly represent the actual breeding population. Table IV is a comparison of uncorrected goose breeding ground surveys, 1953 to 1955.

With exception of the Snake and Wind River populations, which have held their own, or increased, geese in the remainder of the State have registered a sharp decrease over the past three-year period.

**Table I. - Summary of Duck Breeding Ground Survey in Wyoming, May, 1955.**

Species	Sample		Estimated Population	
	Pairs	Total	Pairs	Total
Mallard	584	1,281	29,558	64,834
Pintail	106	231	5,365	11,691
Teal	70	224	3,543	11,337
Shoveler	74	183	3,745	9,262
Gadwall	34	105	1,721	5,314
Baldpate	36	92	1,822	4,656
Redhead	23	46	1,164	2,328
Coot	9	88	456	4,454
B. Goldeneye	4	8	202	405
Am. Merganser	13	26	658	1,316
Ruddy Duck	6	27	304	1,367
Scaup	4	8	202	405
Unknown	136	276	6,883	13,969
 Total	 1,099	 2,595	 55,623	 131,339

Wyoming Area                                    97,914 Square Miles  
 Total Area Sampled                            54,249 Square Miles  
 The Total Breeding Ground in Sample        2,239 Square Miles  
 Average Pairs Per Square Mile                .49  
 Average Ducks Per Square Mile                1.16

#### Computation of Correction Factors:

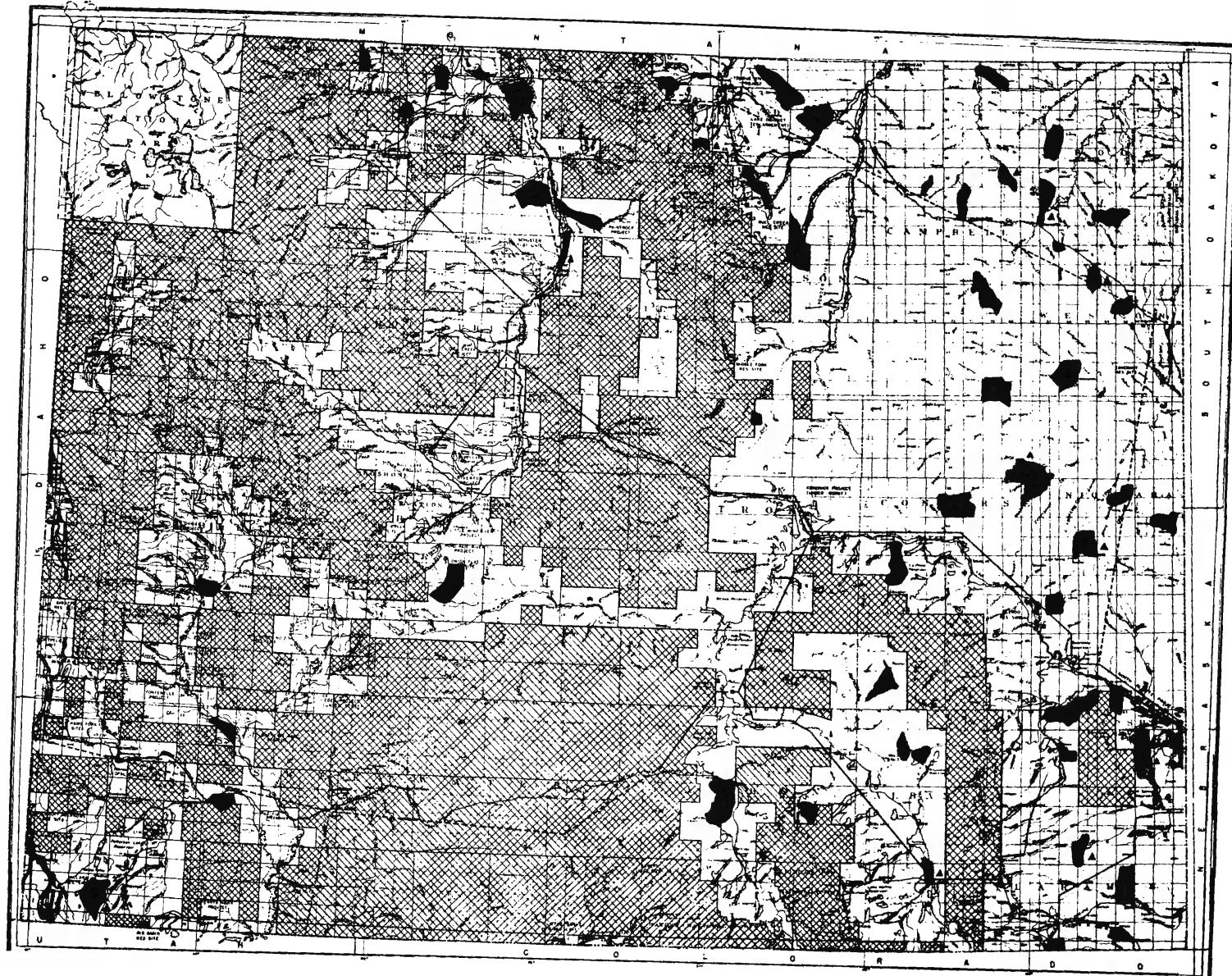
##### Aerial Count of Ground Check Areas (22.7 Square Miles)

Pairs	27
Single Males	34
Single Females	2
Groups	9
Total	135

##### Ground Count of Ground Check Areas

Pairs	77
Single Males	58
Single Females	1
Groups	10
Total	282

$$\text{Correction Factor} = \frac{282}{135} = 2.0889 \quad \text{Blow-up Factor} = \frac{54,249 \times 2.0889}{2,239} = 50.6122$$



1955 WATERFOWL BREEDING GROUND SURVEY  
STATE OF WYOMING

LEGEND

■ AREA EXCLUDED FROM BREEDING GROUND STUDY

■ SAMPLED AREA

▲ INDICATES THAT A SURVEYED AREA



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Table II. - Canada Goose Breeding Ground Survey, Wyoming, 1955.

Drainage	Non-Breeding Prs.	Breeding Singles	Groups	Total
Green	21	23	31	119
Bear	60	56	38	270
Snake	88	76	109	437
Wind	17	13	37	97
North Platte	41	43	51	219
<b>Total</b>	<b>227</b>	<b>211</b>	<b>266</b>	<b>1,142</b>

Table III. - Table II Adjusted by Green River Correction Factor\*

Drainage	Non-Breeding Prs.	Breeding Singles	Groups	Total
Green	37	40	55	209
Bear	105	99	67	475
Snake	155	134	192	770
Wind**	17	13	37	97
North Platte	72	75	91	385
<b>Total</b>	<b>386</b>	<b>361</b>	<b>442</b>	<b>1,936</b>

\* Correction Factor = 1.76

\*\* Correction Factor Not Applied.

Table IV. - Comparison of Canada Goose Breeding Ground Surveys on Identical Areas, 1953 - 1955.

Drainage	Number of Total Geese		
	1953	1954	1955
Green	336	204	119
Bear	369	183	270
Snake	506	267	437
Wind	13	103	97
North Platte	509	296	219
<b>Total</b>	<b>1,733</b>	<b>1,053</b>	<b>1,142</b>

## WATERFOWL BREEDING GROUND SURVEY IN COLORADO, 1955

Jack R. Grieb and R. L. Kirkman\*

Introduction

Breeding pair surveys were conducted within the period May 9 to June 2, 1955. During this time, ground counts were made in the Yampa Valley and Brown's Park, and aerial counts in the South Platte, Cache la Poudre, and San Luis Valleys, and North and South Parks. Extremely poor flying weather made it difficult to finish aerial breeding pair counts this spring, the reason surveys were continued until June 2.

Brood surveys were limited to four "check" breeding areas due to an emphasis on summer banding this year. These areas comprise some of the best in the State, and serve as an indicator of conditions in the rest of the areas not included in this survey. The areas represented were North Park, Yampa Valley, Cache la Poudre Valley, and the San Luis Valley (San Luis Valley production estimated on the basis of data supplied by Refuge Manager, C. R. Bryant, from a study conducted by Biologist Fleetwood, on the Monte Vista National Wildlife Refuge).

Weather and Water Conditions

Climatological conditions for Colorado during the 1955 season reflected the effect of a severe and sustained drouth during the past several years. Some regions, especially in the eastern portion of the State, were almost devoid of suitable water areas for ducks at the onset of the breeding season. Late spring precipitation alleviated this situation somewhat; too late, however, to accommodate normal populations of ducks. Western slope water supplies appeared much improved over the past several years. Normal amounts of precipitation fell during the spring, and a near-normal snow pack was present in the mountains.

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\* Cooperating personnel - U. S. Fish and Wildlife Service: Cecil S.

Williams, Central Flyway Coordinator; Ray Buller, Asst. Regional Supervisor, Game Management; Ken Baer, Jim Robinson, and Dick Droll, Game Management Agents, Colorado. Colorado Game and Fish Department: Ronald A. Ryder, Wildlife Technician; E. Boeker and K. Milyard, Pilots; O. Scarvie, student assistant; R. Kirkman, Colorado Coop. Wildlife Research Unit; and Jack R. Grieb, Wildlife Statistician.

Summer conditions were somewhat dryer than at first anticipated, with all portions of the State below normal in this regard. However, it is believed that adequate waters remained to carry existing populations through the summer. State-wide water conditions in 1955 were, on the average, definitely improved over 1954.

### Results

A summary of 1955 breeding pair counts is compared in Table I with counts for previous years. Examination of the totals by areas shows that the drouth had a very definite effect on the number of pairs using each portion of the State this year. For example, the western slope breeding areas, in general, had adequate waters accompanied by an increase in breeding pair numbers. In contrast, the eastern slope, including North Park, did not have satisfactory water conditions at the beginning of the breeding season and populations were well below the past several years.

Considering the entire State, duck breeding pair totals were down 5.9 percent from 1954; down 32.3 percent from 1953 on the basis of five areas; and up 11.6 percent from 1952 on the basis of three areas. Geese were drastically reduced in numbers this year being 73.4 percent under the three-year average 1952 to 1954. Reasons for this reduction is attributed partially to hunting pressure and reduction of nesting habitat. Degree of importance of each factor is not known at this time.

Species composition of the current breeding population is contrasted in Table II with that of 1954 revealing that the majority of species remained about the same as last year. The main exceptions were mallards, which decreased slightly, and gadwalls which showed a definite increase. The several species of divers nesting in Colorado (redhead and scaup) also showed an increase in breeding population this year.

Results of the limited brood survey are briefly summarized in Table III which shows an estimated increase of 16.6 percent in the number of broods, and 13.2 percent increase in the number of young produced on these areas this year over last. Thus, despite low water conditions and reduced breeding populations in some areas at the beginning of the nesting season, nesting success was generally improved over last year resulting in increased production in Colorado for 1955.

Table I. - Summary of Colorado Breeding Ground Conditions, 1955.

Area	Miles of Waterfowl Habitat	Total Square Miles of Waterfowl Habitat	No. of Sq. Mi. in Sample	Estimated Breeding Pairs			
				1952	1953	1954	1955
<u>DUCKS</u>							
San Luis Valley	1,494	143.5	-	-	6744	7504	
North Park	611	55.0	-	5676	3808	2881	
South Platte Valley	1,422	129.0	-	-	2188	1072	
Cache la Poudre Valley	343	36.0	1029	1619	1320	1164	
Yampa Valley	220	22.0	1790	1500	1540	2260	
Browns Park	15	15.0	291	372	217	48	
White River Plateau	360	18.0	580	480	-	-	
South Park	- *	-	-	431	195	145	
Total					16012	15074	
<u>GESE</u>							
Yampa Valley	220	22.0	120	130	110	20	
Browns Park	15	15.0	21	12	8	15	
Total			141	142	118	35	

\* Total square miles of habitat not known for this area.

Table II. - Species Composition of Colorado Breeding Population, 1955.\*

Species	Number		Species Composition %	
	1954	1955	1954	1955
Mallard	11,295	9,633	70.4	63.9
Blue-winged Teal	886	600	5.5	4.0
Pintail	873	750	5.5	5.0
Gadwall	852	1,874	5.3	12.4
Baldpate	552	211	3.4	1.4
Shoveler	542	220	3.4	1.5
Cinnamon Teal	442	509	2.8	3.4
Green-winged Teal	220	407	1.4	2.7
Am. Merganser	114	105	0.7	0.7
Redhead	109	352	0.7	2.3
Scaup	99	369	0.6	2.4
Ruddy Duck	48	44	0.3	0.3
Total	16,012	15,074	100.0	100.0

\* Data derived from permanent transects in all Colorado breeding areas listed in Table I with the exception of the White River Plateau. Data are corrected for unidentified pairs.

**Table III. - Estimate of Total Waterfowl Production on Four "Check" Breeding**

Breeding Area	Broods				Young			
	1952	1953	1954	1955	1952	1953	1954	1955
San Louis Valley	-	-	2293	3750	-	-	12611	20625
Yampa Valley	1360	1030	1030	730	8670	6690	6880	4161
Cache la Poudre Valley	781	800	877	514	4851	4821	4867	2698
North Park	-	3736	1625	1800	-	22864	10075	11520
Total			5825	6794			34433	39004

\* Estimated total production based on sample areas within each breeding ground.

## WATERFOWL BREEDING GROUND SURVEY IN NORTH DAKOTA

I. G. Bue and B. Fashinhauer

### Introduction

This represents the eighth year that state-wide waterfowl surveys have been conducted in North Dakota. In addition to the breeding pair survey, seven brood runs, each averaging about 30 miles were run every seven to 10 days. Previous to this, only one check run for breeding success had been made.

The census work was carried out by personnel of the Pittman-Robertson Division of the State Game and Fish Department.

### Spring Migration

Migrating waterfowl reached North Dakota early with small flocks of pintails and Canada geese reaching the southeastern part of the State about March 9. The peak of migration occurred near mid-April.

Large numbers of diving ducks were present by the third week in April. Scaup were present in large number until the middle of May which is one to two weeks later than usual.

Several species such as blue-winged teal, ruddy ducks, shoveler and gadwall appeared on the scene earlier than in other years.

The movement of snow and blue geese was heavier between April 8 and 13 with white-fronts appearing a few days later. In the Devils Lake region the goose concentration reached an estimated 150,000 birds during the latter part of April.

### Water Conditions

Water conditions in the southern one-half of the State were poor as drought conditions caused many of the smaller areas to be dry. Conditions in the northern one-half of the State were much better as rains of the previous fall and melting snows had filled most of the pothole areas. Table I gives a comparison of water conditions with previous years.

Water conditions for the State as a whole were better than in 1954 but were below the 1950 to 1954 average.

**Table I. - Index to Water Conditions.\***

<u>Average Index</u> <u>1950 to 1954</u>	1954 Index	1955 Index	<u>Percent Change</u> <u>1955 From</u>	
			Average	1954
456, 309	239, 874	343, 432	-24.7	+43.2

\* Index based on the number of water areas per square mile times the square miles in the area sampled.

#### Breeding Pair Inventory

##### Sampling Methods and Area Covered

Sampling techniques in 1955 were identical to those used in other years. Both air and ground counts were employed.

The state-wide aerial count consisted of 18 east-west transects which are 12 miles apart. All waterfowl within a one-fourth mile strip are counted. The aerial transects furnish a two percent sample of the State's land surface and gives an index to the number of waterfowl in the State.

The ground count is made along with the aerial count and furnishes the information on species composition, sex ratios, and breeding cycle development. The ground transects are one-fourth mile wide and sample the various physiographic regions of the State.

The census (both air and ground) were made during the period May 4 to 20. This was a little earlier than on the previous years but was necessary because the breeding cycle for mallards and pintails was a little earlier and new vegetation growth was to the point where it would interfere with breeding pair counts.

#### Breeding Population

The 1955 inventory disclosed an increase of 35.7 percent over that of 1954. However, the breeding population was still 14.3 percent less than the previous five-year average.

Table II shows the breeding survey indices for 1955 in comparison to 1954 and to the previous five-year average. The 1955 data in this table includes a 30.2 percent correction necessary to account for absent females but does not correct for birds missed by the aerial survey.

The 1955 breeding survey indicated that the numbers of all species had increased over 1954. Only baldpate and diver species showed increases over the 1950 to 1954 index while other species showed decreases from the five-year average. The tremendous increase in scaup was due to the survey being slightly earlier and scaup concentrations remaining in the State for a longer period than on previous years. A check run made the latter part of May showed that the scaup had for the most part moved out of the State. However, a slight increase in breeding by all diver species could be anticipated due to the excellent water conditions in the northern one-half of the State.

The distribution of waterfowl throughout the State during the past three years based on the aerial transects is shown by Table III. The northern transects (1, 2, 3, and 4) show a higher population than in 1953. However, transects 5 through 18 show lower counts than in 1953. All of the transects in 1955 were higher than 1954 with the exception of numbers 12, 13, 14, 17, and 18. The largest difference in populations of 1954 compared to 1955 are in transects 1 through 7.

Table II. - Summary of Waterfowl Breeding Ground Trends in North Dakota, 1950 - 1955.

Species	Indices to Total Breeding Ducks			Percent of Change of 1955 Index From:	
	Average Index Inclusive 1950 to 1954	1954 Index	1955 Index	Average	1954
Mallard	195,593	152,542	159,252	- 18.6	+ 4.4
Pintail	351,530	186,788	192,829	- 45.1	+ 3.2
Blue-winged Teal	466,800	275,666	361,314	- 22.6	+ 31.1
Gadwall	84,018	73,946	71,951	- 14.4	+ 2.7
Baldpate	30,434	27,182	31,179	+ 2.4	+ 14.7
Shoveler	129,535	73,410	98,573	- 23.9	+ 34.3
Redhead	40,311	42,919	48,447	+ 20.2	+ 12.9
Canvasback	34,344	15,737	38,374	+ 11.7	+143.8
Scaup	41,257	25,126	167,766*	+306.6	+567.7*
Ruddy	20,160	12,697	19,667	- 2.4	+ 54.9
Others	5,935	8,136	9,833	+ 65.7	+ 20.9
Total Ducks		894,149	1,199,185	- 14.3	+ 34.1
Coot	1,009	518	703	- 30.3	+ 35.7

\* For explanation see "Breeding Conditions" (p. 182).

Table III. - Comparison of 1955 Aerial Survey of Breeding Waterfowl With That of 1953 and 1954.

Transect Number	Square Miles in Sample	Total Ducks Observed			Ducks Per Square Mile		
		1953	1954	1955	1953	1954	1955
1	78.0	1474	1280	1963	18.9	16.4	25.2
2	80.0	1162	1143	2320	14.5	14.3	29.0
3	79.5	1659	1155	2196	20.9	14.5	27.6
4	79.5	1929	1092	1995	24.3	13.7	25.1
5	80.0	1728	580	1050	21.6	7.3	13.1
6	80.7	2072	487	811	25.7	6.0	10.5
7	83.0	1905	718	1120	22.9	8.7	13.5
8	83.0	1189	656	759	14.3	7.9	9.1
9	84.0	1737	912	925	20.7	10.9	11.1
10	85.0	1703	860	949	20.0	10.1	11.2
11	85.0	1432	831	960	16.8	9.8	11.3
12	85.0	972	707	599	11.4	8.3	7.0
13	86.0	1157	811	697	13.5	9.4	8.1
14	86.0	790	809	725	9.2	9.4	8.4
15	87.7	1416	633	959	16.4	7.2	10.9
16	89.0	1136	396	504	12.8	4.4	5.7
17	90.0	1111	826	575	12.3	9.2	6.4
18	89.0	963	1010	599	10.8	11.3	6.7
Total	1510.4	25535	14906	19706			
Average					17.1	9.9	13.1

#### Waterfowl Production

Seven waterfowl breeding population and production routes totalling 244 lineal miles were run every seven to ten days beginning in May and ending in September. The purpose of these runs was to determine the breeding pair population and the success of pairs in bringing off broods. Brood production was determined by aging broods on each run and eliminating on the following weeks those that appeared to be repeat observations from previous weeks.

Table IV shows the breeding pairs, broods observed and success of breeding pair on the seven transects. Success of breeding pairs in the southern half of the State (Wing-Tuttle, Medina-Gackle, and Cleveland-Woodworth routes) appeared to be higher than in the northern one-half of the State. The reason for this is not known although concentration of broods on fewer potholes due to the dry conditions and less emergent brood cover may have had some influence. The over-all success on all routes was 51.2 percent.

**Table IV. - Breeding Pairs, Broods Observed and Success of Breeding Pair  
on the Seven Transects.**

Location of Route	Square Miles Represented	Prs. / Sq. Mile	Brds. / Sq. Mile	Percent Success
N. E. Rugby	7.50	38.90	10.80	27.8
Wing-Tuttle	14.50	12.10	9.03	74.4
Chasely-Hurdsfield	8.00	21.30	11.62	54.7
Antelope Lakes	8.25	25.60	9.88	38.9
Drake-Anamoose	8.75	17.70	10.40	58.3
Medina-Gackle	7.00	20.60	19.10	93.1

#### Banding Operations

A total of 3,077 ducks were banded in 1955. This is nearly double the number banded in any other year. A hard working crew consisting of four University of Minnesota Wildlife students (Charles Schroder, Norman Blix, Arthur Adams, and Carl Svare) working for the North Dakota Game and Fish Department, supervised by U. S. Game Management Agents Harry Jensen and Ed Brevig completed this banding operation in about a month's time.

Table V gives a breakdown of the species, sex and age of the ducks banded.

Table V. - A Summary of Waterfowl Banding Operations - 1955 (Does not include 127 banded on Long Lake Refuge).

Species	Total Banded		Male			Female			Based on Total Birds	Based on Local Birds			Total Local	Percent Local
	No.	%	A.	L.	T.	A.	L.	T.		Adult	Total			
Mallard	161	5.5	5	82	87	6	68	74	54.1	54.7	11	150	93.2	
Gadwall	172	5.8	0	95	95	0	77	77	55.2	55.2	0	172	100.0	
Baldpate	37	1.2	0	21	21	1	15	16	56.8	58.3	1	36	97.3	
G-w. Teal	11	0.4	8	0	8	3	0	3	72.7	-	11	0	0.0	
B-w. Teal	1939	65.7	306	748	1054	184	701	885	54.4	51.6	490	1449	74.7	
Shoveler	56	1.9	0	35	35	0	21	21	62.5	62.5	0	56	100.0	
Pintail	395	13.4	77	162	239	44	112	156	60.5	59.1	121	274	69.4	
Redhead	109	3.7	2	52	54	0	55	55	49.5	48.6	2	107	98.2	
Canvasback	33	1.1	0	17	17	0	16	16	51.5	51.5	0	33	100.0	
L. Scaup	32	1.1	1	18	19	-	13	13	59.4	58.1	1	31	96.9	
Ringneck	2	0.1	1	0	1	1	0	1	50.0	-	2	0	0.0	
Ruddy Duck	3	0.1	-	1	1	-	2	2	33.3	33.3	0	3	100.0	
Total	2950	100.0	400	1231	1631	239	1080	1319	55.3	53.3	639	2311	78.3	

## WATERFOWL BREEDING GROUND SURVEY IN SOUTH DAKOTA, 1955

Ray Murdy and Maurice E. Anderson

### Introduction

This report constitutes a preliminary, partial summary of the findings of the 1955 waterfowl breeding ground surveys through mid-July in South Dakota. These investigations consisted of a survey of the breeding population, a survey of brood density in mid-July, and a brood size survey.

The current breeding ground surveys were conducted in exactly the same manner as in 1954. A brief description of these methods appear below.

### Breeding Population Survey

The breeding waterfowl population survey consisted of two phases which were run concurrently during the period May 9-17. One phase, a gridded, state-wide aerial survey, provided indices to state-wide duck and water area densities and distributions. The second phase, a ground survey in better-than-average habitat in most of the counties, provided (1) observed sex ratios which were used to correct aerially-observed duck densities for unobserved hens on nests, and (2) species composition data which were also used to provide indices to species densities.

The aerial survey was based on a system of 16, east-west, one-quarter mile wide transects spaced 12 miles apart, north to south. As in 1954, all of these transects were flown east of the Missouri River; while west of the Missouri only every other transect was covered. The resulting state-wide coverage totaled 4,260 linear miles or 1,065 square miles. The transects were flown by three pilot-observer teams in light planes. Messrs. J. Donald Smith and Arthur S. Hawkins assisted in the survey by flying the east-river portions of transects 7-10.

The ground survey consisted of 41 standard one-quarter-mile, ground transects run in 41 counties by 32 State Game Wardens and totaling in the neighborhood of 2,000 linear miles, or 500 square miles.

### Brood Density Survey

The mid-July brood density survey was based on the same system of gridded aerial transects as was used for the breeding population survey in May. The brood survey, however, was restricted to the portion of the State lying east of the Missouri River, which usually contains 75 percent to 80 percent of the state-wide breeding population. The survey was made by two pilot-observer teams during the week of July 11-16, which is approximately the same period during which this survey was made in previous years.

The purpose of this survey was to provide indices to current duck brood production through mid-July for comparison with similar indices for previous years. A brood chronology survey is being made which provides estimates of current hatching curves. At the close of the brood season the hatching curves will be used to convert the indices to mid-July brood densities to indices to total brood production for the entire season. However, since the results of the brood chronology survey are not of immediate use in evaluating current brood production, this particular survey is not considered further in this report.

#### Brood Size Survey

The brood size survey consisted simply of brood size observations collected during the brood chronology survey and during the course of other field work. The purpose of this survey was to compare average current brood sizes through mid-July with brood sizes during the same period in previous years.

#### Water Conditions

##### Water Area Densities

The trend toward poorer water conditions which began in South Dakota in 1954 has continued into 1955. Light snowfall last winter with a resulting very light spring runoff coupled with below normal rainfall during the early spring resulted in extremely dry conditions at the start of the current waterfowl breeding season.

These extremely poor conditions are reflected in the number of water areas of all types observed during the annual survey of the breeding waterfowl population in May. The average, state-wide, density of water areas of all types was only 2.35 areas per square mile. This is 49 percent below the 1954 average of 4.64 water areas per square mile, and is 59 percent below the 1950-1954, five-year average of 5.71 water areas per square mile. Current water conditions are by far the poorest on record since extensive surveys were begun in 1950.

##### Water Area Distribution

The physiographic distribution of water areas appearing in Table I indicates that the 1954-1955 reduction in water areas was severe throughout the entire State. This reduction was most severe in the Prairie Hills (70 percent), about average in the Minnesota Valley (56 percent) and James River Valley (56 percent), and least severe in the Missouri Plateau (25 percent) and Missouri Hills (20 percent). It should be pointed out that the fact that the current reduction in the western part of the State (Missouri Plateau and Missouri Hills) was less severe is due to the fact that this area was already extremely dry in the spring of 1954.

### Waterfowl Densities

#### Breeding Duck Population

The current deterioration of water conditions was accompanied by an equally severe reduction in the breeding duck population. The annual survey of the breeding population in May indicated an average, state-wide, observed density of only 4.08 ducks per square mile. The correction factor for unobserved females on nests was determined to be 1.18. Correction of the observed duck density for unobserved females indicated an average, state-wide minimum density of 4.81 ducks per square mile. This is 56 percent below the 1954 density of 10.85 ducks per square mile, and is 54 percent below the 1950-1954, five-year average of 10.50 ducks per square mile.

Application of the average, minimum state-wide duck density of 4.81 to the 74,778 square miles in the State excluding the Black Hills indicates a minimum state-wide population of 360,000 ducks. This is 56 percent below the 1954 population of 826,000 ducks, and is 54 percent below the 1950-1954, five-year average of 787,000 ducks.

### Waterfowl Distribution

The geographic distribution of the breeding duck population is depicted in Figure 1.

The physiographic distribution of the breeding population appears in Table II. The decrease in the breeding duck population was general over the entire State, ranging from 33 percent on the Missouri Plateau to 66 percent in the James River Valley. The physiographic distribution was such that 36 percent of the population was in the James River Valley, 25 percent on the Missouri Plateau, 24 percent in the Prairie Hills, 13 percent in the Missouri Hills, and two percent in the Minnesota Valley.

### Waterfowl Species Composition

The species composition of the breeding duck population as indicated by the number of males of each species observed on the ground transects appears in Table III. Increases in the percent composition over that of 1954 occurred for the blue-winged teal (six percent), mallard (three percent), shoveler (one percent), and ruddy duck (one percent). Decreases occurred for the scaup (seven percent), pintail (three percent), and redhead (one percent).

### Minimum Species Populations

Minimum populations of the various species of ducks in the breeding population are presented in Table IV along with comparisons with the minimum species populations in 1954 and with the average, minimum populations over the five-year period from 1950 through 1954. These minimum populations were

estimated by applying each percentage of species composition to the minimum, state-wide breeding population.

Table I. - Physiographic Distribution of Water Areas of All Types, and 1954-1955

Physiographic Division	Trends.		Change
	1954	Total Water Areas Per Square Mile	
Minnesota Valley	8.81	3.92	- 56%
Prairie Hills	10.61	3.16	- 70%
James River Valley	6.56	2.92	- 56%
Missouri Hills	3.13	2.50	- 20%
Missouri Plateau	2.49	1.86	- 25%
State-wide *	4.64	2.35	- 49%

\* Based on twice the number of water areas and square miles sampled on the Missouri Plateau to compensate for reduced coverage of the Missouri Plateau.

Table II. - Physiographic Distribution of the Breeding Waterfowl Population and 1954-1955 Trends.

Physiographic Division	Uncorrected Ducks/Sq. Mi.		Corrected* Ducks/Sq. Mi.			Est. Minimum Pop.		% State-wide Population		
	1954	1955	1954	1955	Change	1954	1955	1954	1955	Change
Minnesota Valley	10.14	5.45	12.37	6.43	- 48%	15,000	8,000	2%	2%	-
Prairie Hills	18.31	9.28	22.34	10.95	- 51%	181,000	88,000	22%	24%	+ 2%
James River Valley	16.87	5.89	20.58	6.95	- 66%	387,000	130,000	47%	36%	- 11%
Missouri Hills	11.71	5.16	14.29	6.09	- 57%	108,000	45,000	13%	13%	-
Missouri Plateau	2.83	1.95	3.45	2.30	- 33%	135,000	89,000	16%	25%	+ 9%
State-wide **	8.89	4.08	10.85	4.81	- 56%	826,000	360,000	100%	100%	

\* Corrected from ground transect data to compensate for unobserved females on nests.  
Corrected by 1.22 in 1954 and 1.18 in 1955.

\*\* Based on twice the number of ducks observed and twice the number of square miles of the reduced Missouri Plateau coverage.

Table III. - Species Composition of the 1955 Breeding Population in South Dakota  
and 1954-1955 Trends.

Species	No. of Males		Percent Composition			
	1954	1955	1954	1955	Change	
Blue-winged teal	3,165	2,447	41.84	47.75	+	6%
Mallard	1,000	825	13.22	16.10	+	3%
Pintail	1,049	563	13.86	10.99	-	3%
Shoveler	781	561	10.32	10.95	+	1%
Gadwall	353	234	4.66	4.57	-	
Scaup	815	97	10.77	3.84	-	7%
Ruddy duck	98	127	1.29	2.48	+	1%
Redhead	244	91	3.22	1.78	-	1%
Baldpate	33	44	0.43	0.86	-	
Canvasback	23	33	0.30	0.64	-	
Green-winged teal	3	2	0.04	0.04	None	
Total	7,564	5,124	100.00	100.00		

All of the species in the breeding population were less abundant than in 1954. Species which decreased considerably more than average were the pintail (65 percent), redhead (76 percent), scaup (84 percent), and green-winged teal (67 percent). Species which declined about average were the blue-winged teal (50 percent), shoveler (54 percent) and gadwall (57 percent). Species which decreased less than average were the mallard (47 percent), canvasback (eight percent), ruddy (17 percent), and baldpate (14 percent). It should be pointed out that the slight (eight percent) decrease in the canvasback population from that of 1954 could be misleading. The current decrease in the canvasback population is slight because this population had declined considerably in 1954 (minus 40 percent) when the total duck population declined only moderately (21 percent). The apparent extreme reduction in the scaup population does not have much significance because the number of late migrants present at the time of the breeding population survey varies considerably from year to year.

The comparison of current minimum species population with the average minimum species populations for the past five years is similar to the 1954-1955 comparison described above. This is due to the fact that the 1954 populations were close to average for the past five years. The comparison with average minimum, species populations appears in Table IV.

### Water Area Densities

#### Water Conditions

In spite of above normal rainfall in parts of South Dakota following the survey of the breeding population in May, water conditions for waterfowl continued to deteriorate. At the time of the brood density survey in mid-July, there were only 1.22 water areas (other than streams) per square mile in eastern South Dakota. This is 45 percent below the 1954 average of 2.23 water areas per square mile, and is 59 percent below the 1953-1954, two-year average of 2.98 water areas per square mile in mid-July.

### Water Area Distribution

The physiographic distribution of water areas in mid-July is indicated in Table V. Except for the Missouri Hills, which had about the same low number of areas as in 1954 (plus four percent), the density of water areas was down considerably over the remainder of eastern South Dakota. The decrease in water areas was 69 percent in the Minnesota Valley, 59 percent in the James River Valley, and 48 percent in the Prairie Hills.

### Duck Brood Densities

#### Duck Production

The duck brood density survey in mid-July measures the production of duck broods through mid-July. It cannot measure or predict the amount of brood production for the entire breeding season, but it should serve to predict any large scale increase or decrease in brood production.

The current mid-July survey indicated an observed brood density in eastern South Dakota of 0.406 brood per square mile. This is 40 percent below the 1954 density of 0.677 brood per square mile, and 42 percent below the 1953-1954, two-year average of 0.69 brood per square mile in mid-July. Since the current hatch appears to be considerably earlier than that of 1954, it would appear that total brood production for the current season will be at least 50 percent below that of 1954.

### Duck Brood Distribution

The physiographic distribution of duck broods in mid-July is indicated in Table V. Brood production at that time was apparently ahead of 1954 production in the Minnesota Valley (plus 70 percent), and Missouri Hills (plus 43 percent) and behind 1954 production in the Prairie Hills (minus 42 percent) and James River Valley (minus 60 percent).

### Duck Brood Sizes

Current brood sizes through mid-July average the same as average brood sizes during the same period in 1953 and 1954. The average size of 482 broods of all species and age classes averaged 7.38 young per brood. This is within five percent of the 1954 average of 7.77 young per brood. It is also within five percent of the 1953-1954, two-year average of 7.76 young per brood for broods observed through mid-July.

### State-wide Summary

The trend towards poorer water conditions which started in South Dakota in 1954 has continued in 1955. At the time of the annual survey of the breeding population in May there were only 2.35 water areas of all types per square mile. This is 49 percent below the 1954 average of 4.64 water areas per square mile, and is 59 percent below the 1950-1954, five-year average of 5.71 per square mile. This deterioration of water conditions is general throughout the State. It began in the western part of the State in 1954 and spread throughout the entire State in 1955. Current water conditions are by far the poorest since extensive breeding ground surveys were begun in 1950.

The continuation of drought conditions was accompanied by a continued reduction in the breeding duck population. The annual breeding population survey in May showed an average, minimum, state-wide density of only 4.81 ducks per square mile, indicating a minimum, state-wide population of 360,000 birds. This is 56 percent below the 1954 level of 10.85 ducks per square mile or 826,000 birds. It is 54 percent below the 1950-1954, five-year average population of 10.50 ducks per square mile or 787,000 birds.

The reduction in the breeding population was also general throughout the entire State, ranging from 30 percent on the Missouri Plateau to 66 percent in the James River Valley. The resulting distribution of the breeding population was 36 percent in the James River Valley, 25 percent on the Missouri Plateau, 24 percent in the Prairie Hills, 13 percent in the Missouri Hills, and two percent in the Minnesota Valley.

All species of ducks in the breeding population declined in abundance from 1954 to 1955. Species which decreased considerably more than the average of 56 percent were the pintail (65 percent), redhead (76 percent), scaup (84 percent) and green-winged teal (67 percent). Species which declined about average were the blue-winged teal (50 percent), shoveler (54 percent), and gadwall (57 percent). Species which decreased less than average were the mallard (47 percent), canvasback (eight percent), ruddy (17 percent), and baldpate (14 percent). The slight decrease in canvasbacks in 1955 was undoubtedly due to the fact that this species experienced a severe reduction in 1954.

The current reduction in water levels continued throughout the breeding season. At the time of the annual, brood density survey in mid-July there were only 1.22 water areas other than streams per square mile in eastern South Dakota. This is 45 percent below the average of 2.23 areas per square mile at the same time in 1954. It is 59 percent below the 1953-1954, two-year average of 2.98 water areas per square mile in mid-July. This reduction in mid-July water area densities was general, but was more pronounced in the eastern one-third of the State which had not been affected by drought as severely as the western portion had in 1954.

Current duck brood production through mid-July showed a corresponding reduction similar to that of current water conditions and the current breeding population. The mid-July, brood density survey indicated an average, observed density of 0.406 brood per square mile in eastern South Dakota. This is 40 percent below the 1954 density of 0.677 brood per square mile. It is 42 percent below the 1953-1954, two-year average of 0.695 brood per square mile. Since the current hatch appears to be considerably earlier than that of 1954, it seems probable that brood production for the entire 1955 season will be about half of the production realized in 1954.

The average size of the broods currently produced is apparently equal to that of former years. Brood sizes through mid-July averaged 7.38 young per brood which is within five percent of both the 1954 average of 7.77 young per brood and the 1953-1954, two-year average of 7.76 for broods observed through mid-July.

Table V. - Indices to Water Area Densities and Duck Brood Densities in Mid-July and 1954-1955 Trends in Eastern South Dakota.

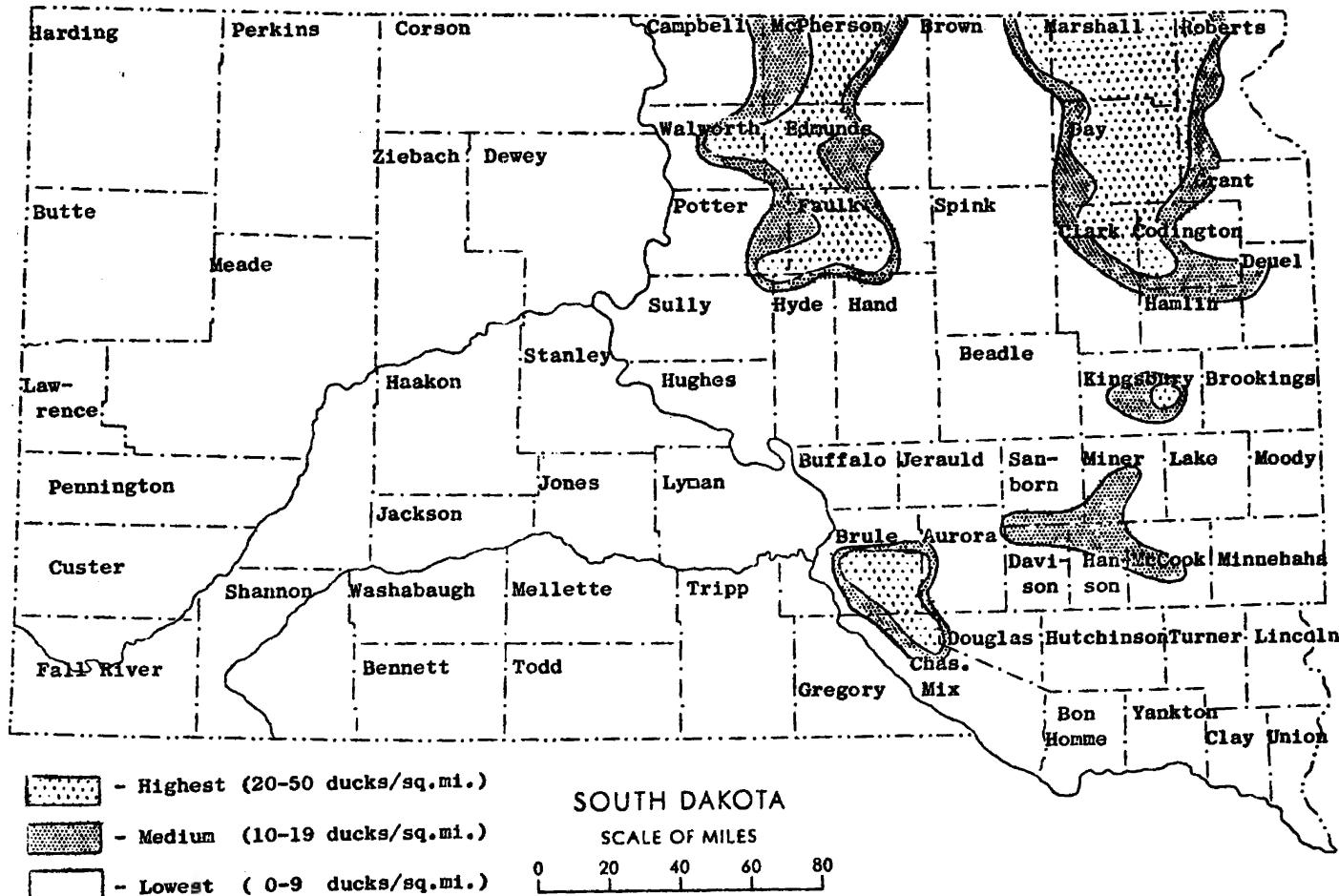
Physiographic Division	Water Areas			Duck Broods		
	Water Areas		Change	Duck Broods		Change
	Per Sq. Mile *	1954	1955	Per Sq. Mile	1954	1955
Minnesota Valley	1.78	0.56	- 69%	0.327	0.556	+ 70%
Prairie Hills	3.05	1.60	- 48%	1.565	0.906	- 42%
James River Valley	2.07	0.84	- 59%	0.452	0.181	- 60%
Missouri Hills	1.71	1.77	+ 4%	0.186	0.329	+ 43%
East-River Totals	2.23	1.22	- 45%	0.677	0.406	- 40%

\* Water areas of all types other than streams.

Table IV. - Comparisons of Minimum Species Breeding Populations in South Dakota.

Species	1955 Minimum Population	1954 Comparison			1950-1954 Comparison		
		1954 Minimum Population	Change	Percent Change	Avg. 1950-54 Minimum Population	Change	Percent Change
Blue-winged Teal	171,900	345,900	-174,000	- 50%	344,900	-173,000	- 50%
Pintail	39,600	114,500	- 74,900	- 65%	148,000	-108,400	- 73%
Mallard	58,000	109,200	- 51,200	- 47%	115,700	- 57,700	- 50%
Shoveler	39,400	85,200	- 45,800	- 54%	73,100	- 33,700	- 46%
Gadwall	16,500	38,500	- 22,000	- 57%	28,300	- 11,800	- 42%
Redhead	6,400	26,600	- 20,200	- 76%	22,000	- 15,600	- 71%
Ruddy	8,900	10,700	- 1,800	- 17%	11,500	- 2,600	- 23%
Scaup	13,800	89,000	- 75,000	- 84%	34,900	- 21,100	- 60%
Canvasback	2,300	2,500	- 200	- 8%	3,300	- 1,000	- 30%
Baldpate	3,100	3,600	- 500	- 14%	4,300	- 1,200	- 28%
Green-winged Teal	100	300	- 200	- 67%	600	- 500	- 83%
Wood duck	-	-	-	-	500	- 500	-100%
Cinnamon Teal	-	-	-	-	100	- 100	-100%
Total	826,000	360,000	- 466,000	- 56%	787,200	-427,200	- 54%

Figure 1. Geographic Distribution of the 1955 Breeding Duck Population in South Dakota





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## WATERFOWL BREEDING GROUND SURVEY IN NEBRASKA, 1955

Harvey W. Miller

### Introduction

A waterfowl breeding ground survey has been conducted in Nebraska for the eighth consecutive year. The purpose of the survey is to provide indices to the waterfowl population through measuring trends in breeding numbers and production success. All data presented were gathered by the writer except where noted.

### Method of Sampling and Area Covered

The major waterfowl breeding grounds of Nebraska were found in the sandhills region. As in past surveys, the counties located within this region were used as the study area. To improve the reliability of the data, this region was divided by the somewhat different habitat types into the eastern central, and western sandhills. These areas were then further divided into sections of relatively abundant and relatively scarce waterfowl habitat with different sampling rates applied to each.

Aerial transects, selected at random, were then flown over each area. Only observed ducks were recorded by two observers along a one-fourth mile wide strip. Observations were made from 100-150 feet of altitude using a Cessna 170 airplane which cruised at calculated ground speeds of 90 to 105 miles per hour.

Immediately following the aerial surveys, ground counts were made along roads through representative parts of each area. Data from these counts were used to determine the species composition, lone male-pair ratio, and the non-breeding-breeding duck ratio.

### Weather and Water Conditions

Drought conditions prevailed over the sandhills during late 1954 and until June, 1955. Unseasonably warm temperatures and high winds were general during the spring and several dust storms occurred over the area.

A cool, rainy period during early June brought the rainfall total to near normal for that time and temporarily relieved the drought conditions. From mid-June until mid-October, rain fell in only localized areas with drought conditions becoming critical over the remainder of the sandhills.

These conditions resulted in a very severe dry up of waterfowl habitat in the eastern sandhills. While no habitat data has been recorded during the aerial surveys, it was estimated that approximately 80 percent of the water areas present in 1954 were gone at the time of the 1955 surveys. This loss included

nearly all the potholes, small lakes, and some larger lakes of 100 acres or more. Continued drought until mid-October has resulted in the loss of more than one half of those areas present during the mid-May surveys.

The dry-up in the central and western sandhills was much less severe with only some small potholes lost from the 1954 season. Water levels in the larger lakes, controlled mostly by ground water, were generally good. The normal seasonal dry-up occurred leaving most permanent water areas with average levels in mid-October.

#### Breeding Population Trends

Table I. - Sandhill Aerial Transect Data Summary.

Strata*	Square Miles in Area	Sq. Mi. Sampled	Ducks Observed	Ducks Per Square Mile	Total Duck Index**
<u>Eastern</u>					
Less than 1/2 Duck Habitat	734	39.50	0	.00	0
More than 1/2 Duck Habitat	3859	273.25	732	2.68	10,342
<u>Central</u>					
Less than 1/2 Duck Habitat	1815	34.50	0	.00	0
More than 1/2 Duck Habitat	2831	115.00	1189	10.34	29,273
<u>Western</u>					
Less than 1/2 Duck Habitat	2814	29.25	0	.00	0
More than 1/2 Duck Habitat	4178	233.00	2931	12.59	52,589

\* Each area was divided by all the possible flight paths that were more than one-half and those that were less than one-half within relatively abundant duck habitat areas.

\*\* Ducks per square mile x square miles. Counts made May 10-18, 1955. Conservation Officer Ralph Von Dane, Pilot, U. S. Game Management Agent W. G. McClure, and writer, observers.

Table II. - Aerial Count Trends.

Area	Ducks Per Sq. Mi.	Ducks Per Sq. Mi.	Percent Change
	1954	1955	1954 to 1955
Eastern	13.51	2.25	- 83.3
Central	9.00*	7.03	- 21.9
Western			
Over-all	10.30	5.68	- 44.9

\* The 1954 aerial count did not separate the central and western area; this count was made one month later than the eastern count. The figures given here have been adjusted to a mid-May count by ground count data which showed a loss of 31 percent in observed ducks for the corresponding period.

Table III. - Summary of Species Indices.\*

Species	Eastern	Central	Western	Over-all
Mallard	4,259	11,360	16,379	31,998
Gadwall	300	2,182	8,261	10,743
Baldpate	310	431	992	1,733
Pintail	1,213	3,345	6,308	10,866
Green-winged Teal	310	292	316	918
Blue-winged Teal	7,001	13,035	12,953	32,989
Shoveler	600	1,307	3,503	5,410
Redhead	155	1,302	3,384	4,841
Canvasback	-	-	526	526
Scaup	-	602	421	1,023
Bufflehead	-	-	316	316
Goldeneye	-	59	-	59
Ruddy Duck	-	144	298	442
Total Breeding Ducks	14,148	34,059	53,657	101,864
Non-Breeders	-	3,148	9,679	12,827
Total, All Ducks	14,148	37,207	63,336	114,691

\* Species composition determined from ground counts made immediately following aerial counts. Species indices for each area corrected for non-breeding ducks and for hens nesting represented by lone males.

The total duck index for the sandhills, uncorrected for nesting hens, is 92,204. As the 1954 surveys were made at different times using a different method, no directly comparable index is available. Table II presents a comparison of observed ducks per square mile adjusted for the difference in survey methods.

In the central and western areas, the corrected breeding duck indices for mallards and blue-wings are comparable with the 1954 indices. Canvasbacks, redheads, and ruddys show losses in excess of 50 percent. Pintails and gadwalls show gains in excess of 50 percent of the 1954 indices.

The loss of breeding ducks in the eastern area is reflected equally by all species.

#### Success of the Season

Table IV presents the available data on production trends. As no breeding pair counts were made during mid-June, 1955, the brood per pair figures are not available. However, observations indicate good nesting success for most species.

The first mallard and pintail broods were observed nearly two weeks earlier than the average date for the prior four years. The hatching peak for other species, however, appeared to be near normal with no significant evidence of re-nesting noted.

Table IV. - Mid-July Sandhill Brood Counts.

	Western Routes	Eastern Routes	Over-all Routes
Broods Observed	53	6	59
Total Ducklings	354	43	397
Ducklings Per Brood	-	-	6.7
Square Mile Sampled	33.8	8.3	42.1
Broods Per Square Mile			
1955	1.6	0.7	1.4
1954	1.5	0.9	1.4
Change, 1954 to 1955	+ 7 %	- 22 %	None
Average Broods Per Sq. Mi.			
1948 - 1954	2.1	2.9	2.2
Change, Average to 1955	- 29 %	- 69 %	- 37 %

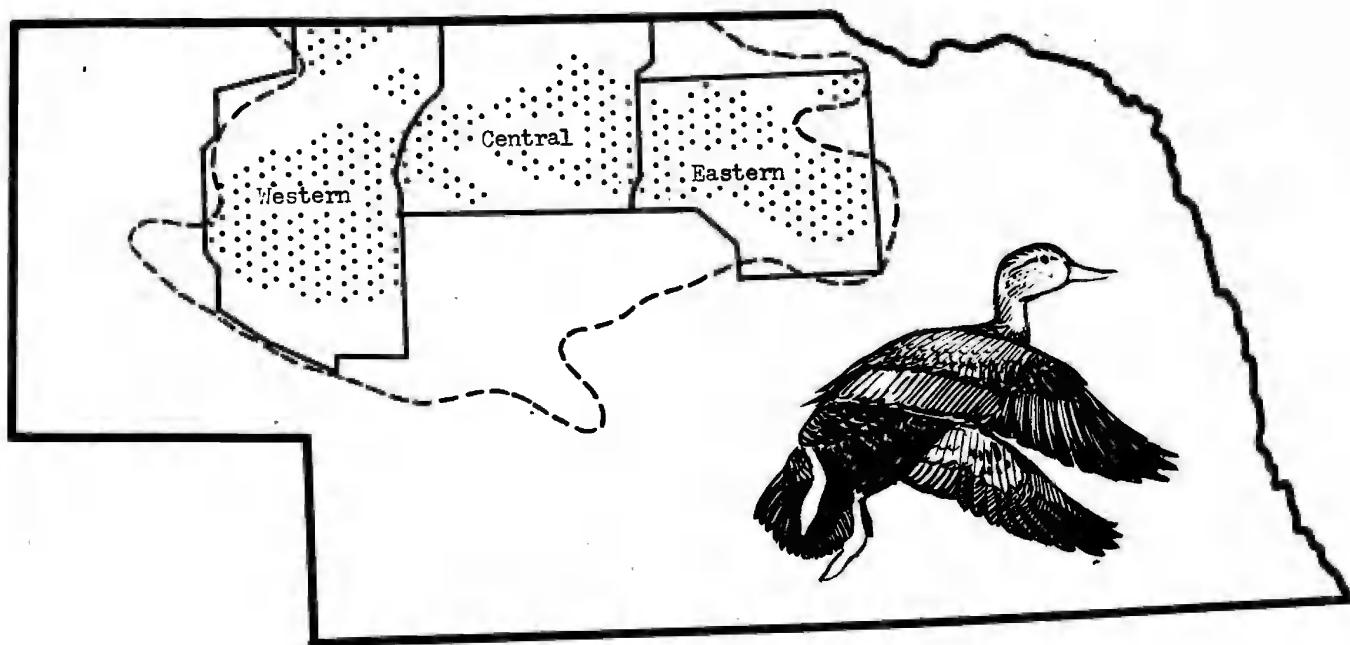


Figure I Nebraska Sandhills Waterfowl Breeding Grounds

- Approximate Boundary, Major Sandhills Region
- Study Area Boundaries
- [Dotted Box] Waterfowl Habitat Areas



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Summary

A 45 percent loss in the breeding duck index for the Nebraska sandhills occurred during 1955 as compared to 1954. This loss appears to have been directly related to the loss in available habitat which was very severe in the eastern area and minor in the central and western areas.

Production appears to have been good; possibly some of the loss in breeding ducks was offset by good hatching success.

**WATERFOWL SURVEY CHIPPEWA NATIONAL FOREST-MINNESOTA,**

1937 - 1955

William J. Ellerbrock, Jr.

Introduction

The annual Chippewa National Forest waterfowl survey was taken for the fourteenth time since 1937. Minnesota Waterfowl Biologist Forrest B. Lee, Biologist Aid Dana Struthers, U. S. Game Management Agents Loren J. Bonde, Joseph W. Hopkins and William J. Ellerbrock conducted the census production studies during the week of July 10 to 15, 1955. The methods and times were the same as the previous year.

Weather and Water Conditions

The water levels rose gradually from 8.27 April 1 to 10.40 July 10 at the Winniebigoshish Dam. All water levels were about the same as last year except for Mud Lake where the water varied from two inches to 20 inches and Kitchie Lake where some rice was being killed due to high water levels. Aquatic vegetation was more abundant this year, especially in Mud Lake and the Third River Area, the abundance of vegetation in these two areas made an accurate census impossible. Rice in Mud Lake varied between two and four feet in height and with low water was practically impossible to census. The same condition existed in the Third River area with other types of vegetation. The temperature during the census period varied from 49 to 84 degrees, wind velocity varied from five to 12 miles per hour, there were no calm mornings or evenings during the census period. There was .07 inches of precipitation during the census period.

A preliminary check was made on Round Lake June 13, at that time 17 broods of goldeneyes were counted while censusing the lake. During the census of July 10, only nine broods were observed, also the adult population was down 34 birds.

Table I illustrates the results of 1955 as compared with the previous years.

Table I. - Results of 1955 Census Compared with Previous Years.

Area	1939											Change From 1939
	1940	1947	1948	1949	1950	1951	1952	1953	1954	1955		
Bowstring	519	498	416	337	521	545	263	120	285	173	-346	
Burns	215	107	170	84	108	103	231	29	126	131	-74	
Kitchie	241	168	239	48	69	161	246	117	165	163	-78	
Lower Pigeon Lake	28	5	24	30	57	35	50	12	26	48	+20	
Mud Lake	181	230	271	200	81	45	24	9	110	19	-162	
Rabideau Lake	94	119	215	49	64	140	193	153	185	85	-9	
Raven Lake	198	33	22	17	25	18	128	22	1	22	-176	
Round Lake	580	490	606	574	382	565	714	261	198	468	-112	
Third River	650	420	1010	526	301	1019	239	61	258	151	-499	
Lake Winniebig- oshish	568	262	88	224	157	202	104	142	98	101	-467	
Total	3274	2332	3108	2089	1765	2833	2192	926	1452	1361	-1913 58%	

Species Composition

The six main species of breeding ducks on the Chippewa National Forest area have been the mallard, baldpate, goldeneye, ringneck, blue-winged teal and wood duck. Table II illustrates the species composition encountered since the inception of the census.

Table II. - Species Composition, 1937-1955.

Year	Mallard	Baldpate	Goldeneye	B. W.	Teal	Wood Duck	Ringneck	Other
1937	32	5	20	22	-	-	13	8
1938	49	3	10	23	-	-	9	6
1939	45	4	15	28	-	-	5	3
1940	44	7	15	21	-	-	10	3
1941	47	12	11	14	-	-	4	6
1947	49	15	19	7	-	-	5	6
1948	52	17	13	10	-	-	8	3
1949	44	24	19	6	-	-	4	3
1950	43	30	17	4	-	-	4	2
1951	46	27	17	4	3	-	2	1
1952	48	27	12	4	1	-	2	-
1953	36	22	34	4	2	-	1	1
1954	37	27	22	9	1	-	4	-
1955	43	34	12	2	2	-	6	1

The species composition for 1955 gives a fairly true picture for all species except Blue-winged teal which will be materially increased by the number of mated pairs and the goldeneyes which were observed earlier but absent during the census period.

Brood Averages

Table III illustrates brood averages for the mallard duck for each year since 1937. The brood average of Class III mallards for the total survey area was 7.0 comparable to the 6.9 all time average.

Table III. - Brood Averages for the Mallard for Each Year Since 1937.

Year	Class I	Class II	Class III	All	No. of Broods
1937	-	6.3	6.5	6.5	56
1938	8.8	7.8	6.5	7.3	166
1939	8.8	7.6	7.4	7.8	256
1940	8.7	7.4	7.0	7.8	94
1941	-	7.3	6.7	6.9	17
1947	7.8	7.9	7.0	7.5	67
1948	7.1	7.6	6.8	7.2	102
1949	4.8	6.8	6.7	6.4	31
1950	8.1	7.2	6.6	7.0	49
1951	6.6	6.8	6.3	6.5	92
1952	4.5	7.2	6.7	6.6	127
1953	7.5	5.7	5.6	5.9	18
1954	7.8	7.0	5.5	6.6	44
1955	7.0	7.1	7.0	7.0	51

During the 1955 survey Class III broods exceeded Class I broods by 88 percent. Class III and Class II broods were equal. Maternal hens and incomplete broods were not included in the figures.

Table IV illustrates adult-juvenile ratios for all ducks seen on the census for both 1954 and 1955.

Table IV. - Adult-Juvenile Ratios, 1954 and 1955.

Species	1954			1955		
	Adults	Juveniles	Ratio	Adults	Juveniles	Ratio
Mallard	113	429	1:3.8	135	452	1:3.3
Baldpate	83	307	1:3.7	132	342	1:2.5
Goldeneye	112	209	1:1.9	44	127	1:2.9
B-w. Teal	20	107	1:5.3	15	10	1:0.7
Ringneck	29	23	1:0.8	16	59	1:3.7
Wood Duck	8	5	1:0.6	4	18	1:4.5
Other	4	3	1:0.8	5	2	1:0.4

The ratio of adults to juveniles for all species for each year of the census is as follows:

1937	1938	1939	1940	1941	1947	1948
1:3.0	1:2.2	1:3.4	1:1.5	1:2.7	1:2.2	1:4.0
1949	1950	1951	1952	1953	1954	1955
-	1:2.7	1:2.8	1:3.4	1:1.6	1:2.9	1:2.8

The ratio of juveniles to adults was about average. Compared to the previous year the adult population was down for all species except mallard and baldpate.

#### Summary

There was a tremendous growth of vegetation in all areas this year as compared to the last three years. Vegetation in Mud Lake and the Third River area account for an inaccurate census. Low water levels last fall and gradual raising of water levels this spring probably account for the growth of vegetation.

From the data, we had a decrease of 58 percent compared with 1939 to 1940 census which was considered as par for the area and a six percent decrease over last year; considering the inaccurate census of the Third River and Mud Lake areas, it is believed that the population should show an increase over last year.

## WATERFOWL BREEDING GROUND SURVEY IN MINNESOTA, 1955

Forrest B. Lee et al

### Introduction

Migration, breeding population, and brood data summarized in this report were gathered by area game biologists of the Minnesota Division of Game and Fish: Area I, Milton H. Stenlung; Area II, Vernon E. Gunvalson; Area III, Lester T. Magnus, Roseau; Area IV, Robert E. Farmes, Thief River Falls; Area V, Norman J. Ordal, Fergus Falls; Area VI, John L. Zorichak, Brainerd; Area VII, Walter H. Petraborg, Aitkin; Area VIII, Forrest B. Lee, St. Paul; Area IX, Robert I. Benson, Glenwood; Area X, Gerald T. Bue, Marshall, Area XI, Maynard M. Nelson, Fairmont; and Area XII, William H. Longley, Kasson. John R. Tester gave valuable assistance in all phases of the waterfowl program.

### Weather and Water Conditions

In past springs observations of mallards and pintails have been reported for southwestern Minnesota during late February. This year no such reports were received and this is not surprising since wintry weather prevailed over the State during the last eight days of the month and this cold spell continued for the period of March 1 to 7.

The period March 8 - 14 was characterized by mild weather in the southern half of the State and moderate weather in the north. On March 10 a maximum temperature of 53° F. and a minimum temperature of 33° F. were recorded at Fairmont. At Roseau in the north, the maximum temperature was 38° F. and the minimum temperature was 15° F. on March 9. On March 10 a trace of standing snow was reported at Fairmont, and at International Falls 20 inches of standing snow was measured. Much of the standing snow in southern Minnesota melted during the warm spell of March 8 - 14. However, there was a scarcity of standing water in the fields due to the dry conditions of the previous fall.

The mild weather of March 8 - 14 was accompanied by an influx of waterfowl into the southern half of Minnesota. On March 8, area game biologist Maynard M. Nelson received reports of mallards arriving at Walnut Lake, Faribault County. Mr. Nelson made an aerial survey of Walnut Lake on March 18. A total of 16,000 waterfowl was counted. Mr. Nelson estimated that 85 percent were mallards and 10 percent were pintails.

Area game biologist Robert I. Benson observed that Canada geese moved into Big Stone Lake and Lake Traverse on March 10. He also noted that these geese stayed there for at least two weeks weathering out the cold stormy weather that prevailed March 15 - 28. In general, the migration of ducks and geese up into Minnesota seemed to be held up by the inclement weather of March 15 - 28.

At International Falls 2.2 inches of snow fell on March 19. The snowfall was heavier in the southern part of the State and 4.2 inches was recorded at Fairmont.

Observations indicate that most of the waterfowl which entered the State during the period March 8 - 14 stayed on through the following cold spell. On March 26 and 27 biologists Nelson and Lee examined the Walnut Lake area. Approximately the same number of mallards was seen as had been recorded by Mr. Nelson on the aerial count of March 18. Most of the area was frozen up and most of the mallards were seen resting on the ice. Tufts of breast feathers were common in the ice indicating that at some time during the freeze up mallards and other ducks had become frozen in the ice and slush and had to break away pulling out feathers. About thirty dead waterfowl of several species including coots were picked up and brought to Dr. Dwain W. Warner at the University of Minnesota. Dr. Warner found that most of these birds contained lead shot in their gizzards.

Mild weather again occurred during the period March 29, 30, and 31, and continued generally until after the middle of May. The months of April and May were generally warm, dry, and windy. In areas X and XI the ice had gone out of the larger lakes by April 8.

During the period April 5 - 9 area game biologist Vernon E. Gunvalson observed paired mallards and blue-winged teal on wooded ponds, potholes and field wet spots in Clearwater, eastern Polk, Itasca and Aitkin Counties.

Biologist Magnus reported below freezing temperatures from 30° F. on May 7 to 22° F. on May 8 accompanied by a trace of snow at Roseau. Biologist Gunvalson reported slight snow and sleet and 40 MPH. winds in the Bemidji vicinity on May 7. Most of the biologists estimated that the phenological development of the season was at least 10 days ahead of previous springs.

#### Breeding Population Trends

This year the breeding pair survey consisted of the usual auto transect routes, but in addition the aerial transects which were established in 1951 were flown again.

The aerial sampling was begun on May 10, commencing along the Iowa border with transect number 32 and finishing on May 15 near the Canadian border with transect number 1. The Bureau of Game Cessna 170 was used with Forrest Lee and John Tester observing. Waterfowl data were recorded by Lee, and Tester recorded the water data. Waterfowl data were recorded in 12-mile units of the quarter-mile wide sample strips. The quarter-mile strips, extending in an east-west direction, include approximately two (plus) percent of the area being sampled. Transect lines totaled 3,108 miles, or 777.3 square miles of sample. This sample represents 37,296 square miles sampled.

A total of 1,834 ducks was recorded this year compared with 2,841 in 1952 and 2,875 in 1951. In other words, a density of 2.36 ducks per square

mile was noted compared with 3.65 ducks per square mile in 1952 and 3.69 ducks per square mile in 1951. This is a 35.5 percent decrease from 1952 and a 36.2 percent decrease from 1951.

Water area data were recorded along a half-mile strip giving a 4.2 percent sample. A 21.7 percent decrease in number of water areas occurred from 1951 to 1955. A 35.5 percent decrease in acres of water occurred from 1951 to 1955. Water area data are shown on a map attached to this report.

Table I. - Aerial Transect Data for 1955 for Minnesota.

Transect No.	Sq. Miles Sampled	Total Ducks Seen			
		1951	1952	1953	1955
1	18.0	60	23	-	22
2	17.3	13	12	-	21
3	18.0	29	14	3	6
4	17.8	268	85	-	246
5	17.8	32	16	23	10
6	17.0	41	22	-	9
7	15.0	9	7	-	12
8	15.0	18	26	-	60
9	15.0	70	40	68	42
10	15.0	26	28	-	43
11	15.0	62	51	41	13
12	12.0	77	59	-	21
13	12.0	56	46	60	26
14	12.0	20	44	-	102
15	11.3	24	57	73	34
16	12.0	14	26	-	32
17	18.0	47	60	-	65
18	21.0	102	231	-	36
19	29.5	83	182	163	67
20	30.0	159	215	-	66
21	32.5	302	219	440	90
22	32.5	80	268	-	112
23	32.8	201	194	301	87
24	32.8	118	150	-	116
25	33.0	116	111	142	44
26	36.0	136	115	-	92
27	36.0	209	171	318	90
28	39.0	70	74	-	94
29	39.0	64	57	68	23
30	42.0	83	55	109	86
31	42.0	118	58	214	52
32	42.0	68	125	269	15
Total	777.3	2,875	2,841		1,834

The ground survey consisted of comparable auto transects driven in 48 counties from May 6 to May 26. These routes totaled 1,874 miles and were run in Game Management Areas II, III, V, VIII, IX, XI, and XII which include the principal waterfowl breeding range in the State. The auto transect data are shown in Table II.

This year 1.66 pairs of ducks per square mile were recorded compared with 3.17 in 1954, 2.41 in 1953, 1.89 in 1952 and 1.24 in 1951. The 2.18 pairs per square mile figure shown in parenthesis for 1954 is believed to represent a more accurate figure for that year as is explained in the 1954 report.

Table II. - Auto Transect Data Summary.

	1951	1952	1953	1954	1955
Number Counties:	51	48	48	48	48
Total Miles:	1,945	1,853	1,891	1,866	1,874
Square Miles:	486.3	463.3	472.8	466.5	468.5
Total Water Areas:	1,693	1,451	2,150	2,421	1,421
Water Areas Per Sq. Mi.:	3.5	3.1	4.6	5.2	3.0
Areas Occupied:	340	429	549	506	284
Total Pairs:	603	876	1,141	1,477	776
Percent Occupied: (Areas)	20.1	29.6	25.5	20.9	20.0
Pairs Per Square Mile:	1.24	1.89	2.41	3.17 (2.18)*	1.66
Total Ducks:	1,219	1,590	2,885	2,933	1,342
Ducks Per Square Mile:	2.51	3.43	6.11	6.29	2.86
Coots:	145	539	535	967	94

\* Pair Per Square Mile Figure When Adjustments are Made  
For Blue-winged Teal for Areas X and XI.

Table III. - Species Data of Auto Transects.

Species	Number of Pairs *						Percent Composition					
	1951	1952	1953	1954	1954	1955	1951	1952	1953	1954	1954	1955
	**											
B-w. Teal	277	386	603	897	439	399	45.9	44.1	52.9	60.7	43.1	51.4
Mallard	135	173	204	165	165	162	22.4	19.8	17.9	11.2	16.2	20.9
Ringneck	74	133	102	87	87	93	12.3	15.2	8.9	5.9	8.5	12.9
Pintail	44	48	63	51	51	25	7.3	5.5	5.5	3.5	5.0	3.2
Redhead	14	43	39	44	44	10	2.3	4.9	3.4	3.0	4.3	1.3
Shoveler	18	19	33	56	56	21	3.0	2.2	2.9	3.8	5.5	2.7
Baldpate	5	12	25	28	28	17	.8	1.4	2.2	1.9	2.8	2.2
Gadwall	4	5	7	28	28	9	.7	.6	.6	1.9	2.8	1.2
Ruddy Duck	17	10	7	17	17	6	2.8	1.1	.6	1.5	1.7	.8
Canvasback	-	1	7	6	6	4	-	.1	.6	.4	.6	.5
Goldeneye	3	9	5	12	12	5	.5	1.0	.4	.8	1.2	.6
Wood Duck	2	2	5	7	7	5	.3	.2	.4	.5	.7	.6
G-w. Teal	2	4	3	18	18	8	.3	.5	.3	1.2	1.8	1.0
Black Duck	1	-	-	-	-	.2	-	-	-	-	-	-
Mergansers	-	-	1	-	-	-	-	-	.1	-	-	-
Bufflehead	-	-	3	-	-	4	-	-	.3	-	-	.5
L. Scaup	5	28	26	52	52	4	.8	3.2	2.3	3.5	5.1	.5
Unidentified	2	3	8	9	9	4	.3	.3	.7	.6	.9	.5
Total	603	876	1141	1477	1019	776	99.9	100.1	100.0	100.2	100.2	99.9

\* Lone females and males counted as pairs.

\*\* 1954 data if adjustments are made for number of blue-winged teal in Areas X and XI.

This year 3.0 water areas per square mile were tallied compared with 5.2 in 1954, 4.6 in 1953, 3.1 in 1952, and 3.5 in 1951. Drought conditions prevailed over most of the State during much of May and including the time of the surveys.

A total of 284 water areas was occupied by ducks this year along the transect routes. This is a considerably lower rate of occupancy than has previously been found along the routes.

A general decline is noted in the number of coots observed.

Table III shows species data of the auto transects. An additional column is supplied to show 1954 data when adjustments are made in number of blue-winged teal in Areas X and XI. The 1954 report explains how abnormal weather conditions resulted in a high count for these areas.

Blue-winged teal decreased to about the 1952 level. The number of mallards was the lowest since 1952. Ringnecks were slightly more numerous than last year but were scarcer than in 1952 and 1953. Pintails and redheads were less numerous than in the previous four years.

#### Success of the Season

Brood counts were made in 10 game management areas this year. Three counts were made in order to secure data for construction of a hatching curve for the year. Periods of counts were as follows: First count, June 27 to July 1; second count, July 25 to 29; third count, August 25 to 31.

Weather and water conditions through mid-May have been discussed earlier in this report. Biologist Robert E. Farmes reported that cold rainy weather the last week in May and first week in June probably interfered with the hatch of blue-wings and ringnecks in Area IV. Heavy rains occurred in July in Areas V and IX.

In general weather conditions were quite favorable for nesting this year. As has been discussed previously in this report, water levels were low this spring and there were fewer water areas due to drainage and arid conditions. Twenty percent of the existing areas were occupied by breeding pairs. Weather conditions, however, were generally ideal for the existing breeding ducks to successfully incubate and rear their broods. General rains in June delayed hay mowing at a time when broods were coming off and this no doubt saved many nests.

Brood size data of the first brood counts for the past four years are summarized as follows:

Year	Class I	Class II	Class III	All
1952	7.3	7.8	6.6	7.4
1953	7.3	7.2	6.2	7.2
1954	7.7	7.1	6.0	7.5
1955	8.5	7.5	7.7	8.0

The 1955 average brood size of 8.0 indicates that this year's broods averaged considerably larger than usual. The 1955 brood size data is based on a total of 180 aged broods. The number of broods by species is as follows: mallard, 85; blue-winged teal, 32; goldeneye, 29; canvasback, 13; ringneck, 5; baldpate, 4; pintail, 4; redhead, 4; wood duck 2; black duck, 1; hooded merganser, 1.

The earliness of the hatch is indicated by the fact that 18.9 percent of the broods were of Class III compared with 1.5 percent in 1954. The percent distribution of the broods by age classes is as follows:

Year	Class I	Class II	Class III
1952	33.6	45.7	20.7
1953	61.8	32.4	5.9
1954	62.8	35.8	1.5
1955	40.0	41.1	18.9

The nature of the hatch is best illustrated by the hatching curve prepared from the data of the three brood counts (Figure 1). The data for each brood count area was considered separately, and broods observed on the second or third counts were eliminated if hatching dates indicated they may have been recorded on an earlier count.

Considering all the broods the peak period of hatching was the week of June 7 to 13. The peak period in 1953 was the week of June 21 to 27.

For mallards the peak was the week of June 7 to 13 and during this period approximately 39 percent of the aged mallard broods were hatched. Mallard brood data for 1953 indicate that the greatest number of broods to hatch in a weekly period was approximately 17 percent for the week of May 31 to June 6. These data illustrate how it is possible to observe in a given weekly period twice as many broods of a species as were seen during any period of similar length in another year. Such an observation may lead the lay observer to speculate about big increases in waterfowl when actually there is no or little change at all.

The peak period of hatching for blue-winged teal was during the week of May 31 to June 6. The peak period of hatching in 1953 was June 21 to June 27 for this species.

Three brood counts were made on 10 auto transect routes and individual water areas in six game management areas both in 1953 and 1955. A direct comparison is possible since the data was handled the same in both years and broods were eliminated when hatching dates indicated they could have been recorded on a previous count.

A total of 193 broods were calculated for all 10 areas or transects in 1955, compared with 223 broods in 1953. Increases were noted at Black Duck Lake, Beltrami County, Rice Lake, Steele County, and on the Douglas County auto transect. For the remaining seven locations the number of broods showed some decrease.

A comparison was made of the abundance of the various species on these 10 check areas. Mallards showed a slight increase and baldpates were more abundant. The number of blue-winged teal broods was about the same, however, several of the check areas had fewer of this species. There was a definite reduction in the number of ringneck, ruddy duck and redhead broods.

Our brood counts are most valuable as a source of information for brood size, age class distribution, periods of hatch and general brood conditions. The counts, however, have shortcomings for indicating changes in over-all production in the various habitat types of the State. An aerial brood survey similar to the spring breeding pair count might furnish quantitative information on waterfowl production.

#### Aerial Resident Waterfowl Count

The aerial resident waterfowl count was flown from August 16 to 19. The Bureau of Game Cessna 180 was used with Forrest Lee observing and Donald Ledin piloting. The transects of this census cover the principal duck producing area of Minnesota. The purpose of the census is to give data on the resident duck population of the State at the end of the brood season.

The nine transects of this survey total 948 miles. Seven special areas are checked in addition to the transects. Since the nesting season phenology was advanced this year, the survey was made earlier than the 1952 census which was from August 21 to 28.

The data of the census indicate a comparatively low resident duck population this fall in the region covered by the survey. The transect data are summarized in Table IV.

Table IV. - Summary of Aerial Resident Waterfowl Count Data.

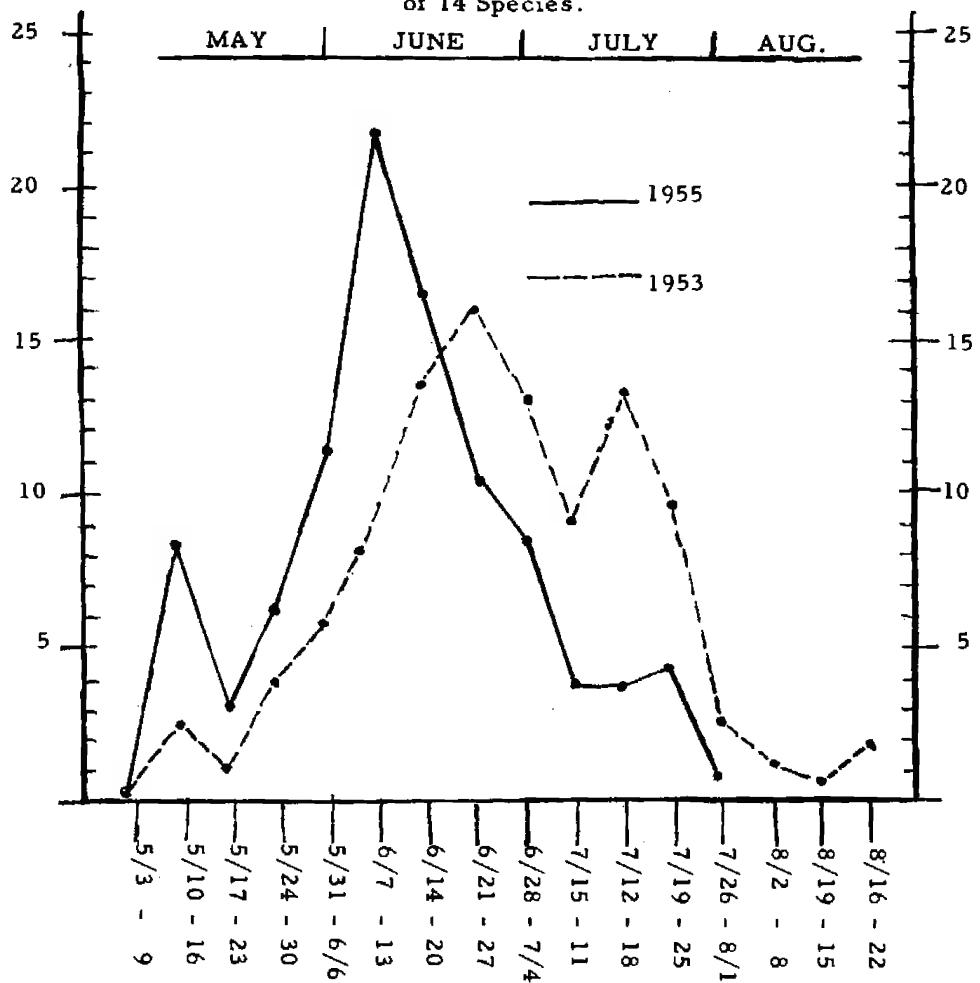
Transect Number	Ducks Seen 1952	Ducks Seen 1953	Ducks Seen 1955
9	206	72	56
11	43	39	70
13	163	142	93
15	226	54	356
17	341	282	270
19	636	452	53
21	1,066	592	254
23	1,170	418	98
25	646	163	55
27	538	328	90
Sub Total	5,035	2,542	1,395
<u>Special Areas</u>			
Minn. River Bottoms	5,000	50	36
Stay Lake, Lincoln Co.	2,000	80	386
Thief Lake, Marshall Co.	15,000	3,860	1,853
Swan Lake, Nicollet Co.	1,700	380	690
Tamarac, Rondo, Rice Chain	2,000	60	827
Wood Lake, Lyon Co.	900	400	52
Lake Christina, Grant Co.	650	2,200	50
Sub Total	27,250	7,030	3,894
Grand Total	32,285	9,572	5,289

Banding

Four banding crews worked in Minnesota during July banding flightters young ducks. Most banding was done in the northern half of the State. The following tabulation is of waterfowl banded in 1955:

	Local Male	Local Female	Adult Male	Adult Female	Adult ?	Local ?	Total
B-w. Teal	295	307	2	25	-	2	631
Mallard	89	93	1	7	-	-	190
Ringneck	83	96	2	7	-	-	188
Redhead	26	34	-	5	-	-	65
Canvasback	22	12	-	2	-	-	36
Baldpate	13	8	-	-	-	-	21
Pintail	11	8	-	-	-	-	19
Goldeneye	5	3	-	-	-	-	8
Shoveler	3	2	-	-	-	-	5
Ruddy	2	1	-	-	-	-	3
Gadwall	2	-	-	-	-	-	2
Black Ducks	-	-	1	-	-	-	1
Lesser Scaup	-	-	-	1	-	-	1
 Total Ducks	551	564	6	47	-	2	1,170
Coots	-	-	-	-	1	9	10
Pied-billed Grebe	-	-	-	-	-	3	3
 Total Birds Banded	551	564	6	47	1	14	1,183

Figure 1. Hatching Curve Prepared from Data of 273 Aged Broods  
of 14 Species.





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## WATERFOWL BREEDING GROUND SURVEY - IOWA, 1955

James G. Sieh

### Introduction

Breeding pair and brood studies have been carried on during routine on-the-spot check counts in the prairie marsh areas of northwestern Iowa since 1949 to evaluate the trend of nesting waterfowl other than wood ducks. Wood duck stream surveys were begun in 1953 and repeated in 1954 and 1955 in an attempt to determine wood duck production trends (Table I). Wood duck nesting box checks have been completed on the Lake Odessa area in Louisa County to determine nesting box utilization and to evaluate production each year since 1950 (Table II). Random nesting box checks have been made intermittently in northwest Iowa since 1949.

Aerial survey of the prairie marshes has continued in northwest Iowa using a lineal census technique which was modified in 1953 and 1954 to attempt total counts on individual lakes, sloughs, and marshes.

### Spring Migration

Following a mild winter early migrants were moving into and through Iowa during the second week in March. Scaup and ring-necked duck were numerous in early April. A large migratory build-up of blue-winged teal developed during the third week in April, while laggard blue-wings, scaup, and shovellers remained in northwestern Iowa during early May. A warm spring hastened migration into and through this State.

### Waterfowl Production

On-the-spot check counts in the prairie marshes of northwest Iowa each spring and summer since 1949, plus aerial coverage of the same marsh units since 1952, have provided a studied opinion as to the production trends of blue-winged teal and mallards. Blue-winged teal constitute the most numerous nesting species in the remaining prairie marshes, and the mallard is not far behind. Production of these two species in 1955 exceeded production during 1952, 1953, or 1954. With the exception of increased production in 1951 which resulted from optimum water levels, excellent nesting and survival conditions, the production trend of ground nesting species, especially blue-wings, and mallards, tend to remain about the same under average phenological conditions. During the last six years of systematic observation, 1951 marks the only year when a large increase of breeding stock occupied the many temporary potholes and nested successfully.

Only a few diving ducks, including redhead, ruddy, and canvasback, continue to nest in Iowa. These species are so few in number that no attempt has been made to evaluate their production trend. Adult lesser scaup have remained in northwest Iowa throughout the nesting season, but no nests, broods, nor young have been observed. Nesting attempts of ring-necked duck have been reported during the last few years, but like the lesser scaup no evidence of successful nesting has been witnessed. A few pintails, shovelers, and gadwall nest in the State, but too few to indicate a trend. In 1955 a few baldpate have likewise been observed.

Special emphasis has been placed upon the study of the wood duck because it has again become an important nester during the last 15 years, and Iowa's contribution to the over-all production of this species is important within the flyway. In 1954 and 1955 both stream survey data and wood duck nesting box checks indicated reduced breeding populations of wood ducks within the State. (Tables I and II.)

The productive potential of the wood duck in Iowa is not well understood, nor is the size of the standing crop. The nesting density of this species and its range throughout the State has increased during the last 10 years, but it is probable that 1949 or 1950 may have been peak years for wood duck production, and that the trend since then has been downward. Many wood ducks harvested in Iowa are probably young birds produced within the State or in neighboring States. The harvest of the past season may be a partial indicator of past production and in some measure indicative of current breeding stock remaining. It is noteworthy that when the waterfowl season has opened in Iowa on October 20 or later, that the removal of potential breeding stock has been reduced roughly one-third or more in Iowa. (Table III.)

Table I. - Wood Duck Stream Survey Data.

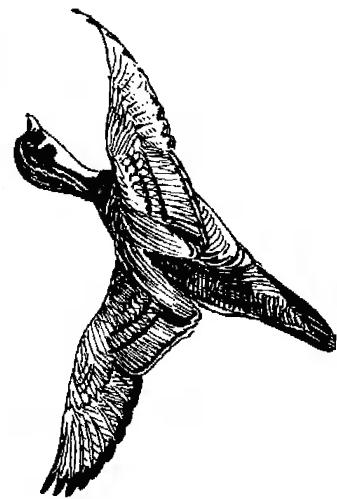
Survey Route Number and Miles Censused	Wood Ducks Counted					Total	Date of Census
	Male	Female	Pairs	Unid.			
1. 8 Miles	-	1	-	4	5	May 9, 1953	
"	1	1	-	-	2	May 11, 1954	
"	-	-	-	-	0	May 12, 1955	
2. 7 Miles	-	-	-	4	4	May 11, 1953	
Route abandoned in 1954 because of stream channel straightened							
3. 7 Miles	1	-	2	-	5	May 11, 1954	
"	-	-	-	-	0	May 12, 1955	
4. 11 Miles	3	2	6	-	17	May 13, 1953	
"	2	2	-	2	6	May 6, 1954	
"	-	-	-	-	0	May 12, 1955	
5. 13 Miles	1	-	3	-	7	May 14, 1953	
"	1	1	-	-	2	May 13, 1954	
"	1	-	-	-	1	May 13, 1955	
6. 12 Miles Route Established in 1954							
"	3	-	-	1	4	May 10, 1954	
"	-	-	-	-	0	May 19, 1955	
7. 18 Miles	6	5	-	4	15	May 5, 1953	
"	1	-	1	5	8	May 7, 1954	
"	3	-	-	2	5	May 6, 1955	
8. 9 Miles	1	-	1	-	3	May 6, 1953	
"	-	1	-	-	1	May 5, 1954	
"	3	1	-	-	4	April 26, 1955	
9. 12 Miles Route Established in 1955							
"	1	-	-	4	5	May 16, 1955	
66 Miles Total All Routes	11	7	13	12	51	May 5-14, 1953	
78 Miles Total All Routes	9	5	3	8	28	May 5-13, 1954	
90 Miles Total All Routes	8	1	0	6	15	April 26-May 16, 1955	

Table II. - Wood Duck Nesting Box Success at Lake Odessa, Louisa County, Iowa.

	1950	1951	1952	1953	1954	1955
No. of Nesting Boxes Checked	26	36	24	30	72 (22 wood) (50 metal)	56 (12 wood) (44 metal)
No. of Nesting Boxes Occupied	18	13 pre - 9 post - flood	18	15	11 (7 wood duck) (4 merganser)	6 (5 wood duck) (1 merganser)
No. of Nests Destroyed by Flood	0	13	0	0	0	0
No. of Eggs Destroyed by Flood	0	108 wood duck	0	0	0	0
Total No. of Potentially Successful Eggs	158	72 wood duck 0 merganser	237 * wood 38 merganser	111 duck 17 merganser	Not Estimated	Not Estimated
No. of Successful Nests	11	6	???	???	???	???
No. of Ducklings Successfully Hatched	129	68	???	???	???	???

\* Abnormal success in 1952 was caused by flooding of other nesting cavities and subsequent large scale dump nesting in these nesting boxes raised up above flood crest; the success does not indicate production trend.

\*\* Student observer not available on full time basis and consequently data not available.





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**Table III. - Recorded Kill Samples of Wood Ducks in Iowa since 1948.**

	<b>1948</b>	<b>1949</b>	<b>1950</b>	<b>1951</b>	<b>1952</b>	<b>1953</b>	<b>1954</b>	
No. of Wood Ducks Reported From All Iowa Counties	114	133	148	464	427	321		C L O S
Percentage of Wood Ducks in Total Mixed Bag Sampled in All Iowa Counties	1.9%	2.3%	3.2%	3.3%	6.8%	3.7%		E D S E
No. of Wood Ducks Reported From Ten Miss. River Counties	50	44	81	138	223	154		A S O N
No. of Miss. River Counties Reporting	8	5	7	9	9	8	ON	
% of Total Wood Ducks Sampled From the Miss. River Counties Reporting	43.8%	33.0%	54.7%	29.7%	52.2%	47.9%	D K	W D O U O C

**Opening Dates of Waterfowl Seasons:**

<b>October</b>	<b>29</b>	<b>21</b>	<b>20</b>	<b>12</b>	<b>8</b>	<b>8</b>	<b>15</b>
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## WATERFOWL NESTING SURVEY - MISSOURI, 1955

Lewis G. Helm

### Introduction

Since 1951 an annual waterfowl nesting survey has been conducted in Missouri by conservation agents, game biologists, and waterfowl area personnel. The purpose of the survey is to obtain trends in the summer resident population of wood ducks, mallards, and blue-winged teal; the survey covers essentially the same streams, lakes, and marshes each year. Each lone drake, lone hen, pair, and brood are recorded as a nesting attempt, and the total nesting effort is computed as the sum of these observations.

This year the survey was carried out during the period May 22 to June 3, and 41 conservation agents, 12 Federal-Aid Biologists, and the managers of five State and Federal areas contributed information.

### Spring Migration

Spring movements of waterfowl were considered to have taken place quite early this year. The unprecedented number of wintering mallards in the State had dwindled to only a few thousand by late March, and blue-winged teal started moving through the State on March 6 or approximately two weeks earlier than most years. Wood ducks were observed in the northern portion of the State by March 9, and females were seen hunting for nest sites soon after that date. Pintails moved through the State in normal numbers during February and early March, while Canada geese and blue and snow geese were beginning their mass movements very early in March.

### Waterfowl Nesting Survey

A summary of the results of the 1955 nesting survey is shown in Table I. This year, 2,610 acres of lake and marsh were censused, 666 miles of stream transects were run, and 4,500 acres of State and Federal waterfowl areas were surveyed. For purposes of comparison, total nesting attempts of wood ducks, mallards, and blue-winged teal are computed as nesting effort per census unit. Small numbers of pintail, baldpates, shovanders, scaup, ring-necked ducks, hooded mergansers, Canada geese, and coots were observed; it is problematical whether any of these birds were potential nesters or merely stragglers of the spring migration. An exception to this is the ring-necked duck brood which was recorded on the Mississippi River in Pike County.

Trend data of the wood duck, mallard, and blue-winged teal nesting efforts are presented in Tables II and III. It will be noted that all of the trends show a downward change, with the exception of the average number of Class I ducklings per brood. Mallard and blue-winged teal observations on streams this year were down 75 percent from 1954; this may have been caused by the early and rapid spring migration of these species.

### Summary

An annual waterfowl nesting survey has been conducted by conservation agents, game biologists, and area managers in Missouri since 1951.

Main nesting species are the wood duck, mallard, and blue-winged teal.

In 1955, 7,110 acres of lakes and marshes were censused, and surveys were made on 666 miles of stream.

Comparable trend data covering the past three years show a continual decline in nesting attempts and numbers of broods of waterfowl in Missouri. Compared to 1954, nesting efforts by wood ducks are down 18 percent on lakes and marshes, and down 41 percent on streams. Mallard and blue-winged teal production was down 7 percent on lakes and marshes, and 75 percent on streams.

Note: The areas and streams censused in 1955 were essentially the same as those shown on the map which accompanied the report on Missouri Waterfowl Population and Breeding Conditions, Summer 1954, Special Scientific Report 27.

**Table I. - Nesting Efforts of Wood Duck, Mallard, and Blue-winged Teal -**  
**Missouri - May 22 to June 5, 1955.**

7,110 Acres of Lake and Marsh	Lone Drake		Lone Hen		Broods			Total Nesting Effort / Sq. Mi.
	Pairs	No.	Total No.	Avg. Young / Brood	Total Nesting Effort			
Wood duck	10	4	15	11	72	6.5	40	.36
Mallard	36	3	23	5	32	6.4	67	.60
Blue-winged teal	4	1	9	4	17	4.2	18	.16
<b>Total</b>	<b>50</b>	<b>8</b>	<b>47</b>	<b>20</b>	<b>121</b>	<b>6.0</b>	<b>125</b>	<b>1.12</b>
666 Miles of Stream	Lone Drake		Lone Hen		Broods			Nesting Effort / Sq. Mi.
	Pairs	No.	Total No.	Avg. Young / Brood	Total Nesting Effort			
Wood duck	19	26	27	17	110	6.5	89	.13
Mallard	7	3	2	-	-	-	12	.02
Blue-winged teal	3	1	4	-	-	-	8	.01
<b>Total</b>	<b>29</b>	<b>30</b>	<b>33</b>	<b>17</b>	<b>110</b>	<b>6.5</b>	<b>109</b>	<b>.16</b>
<b>Grand Total</b>	<b>79</b>	<b>38</b>	<b>80</b>	<b>37</b>	<b>231</b>	<b>6.2</b>	<b>234</b>	<b>-</b>

**Table II. - Trend Data - Wood Duck Nesting Survey - Missouri, 1953-1955.**

	<u>1953</u>	<u>1954</u>	<u>1955</u>	<u>Percent Change</u>
Acres of lake and marsh censused	4,976	4,931	7,110	+ 44
Miles of stream censused	371	581	666	+ 15
Nesting effort per square mile				
lake and marsh	5.8	4.4	3.6	- 18
Nesting effort per mile of stream	.24	.22	.13	- 41
Number of broods	42	31	28	- 10
Broods per mile of stream	.09	.04	.03	- 25
Avg. no. of ducklings, Class I	4.9	5.8	7.3	-
Avg. no. of ducklings, Class II	4.4	7.2	6.2	-
Avg. no. of ducklings, Class III	4.6	-	-	-
Avg. no. of ducklings, All Classes	4.5	6.5	6.7	-

**Table III. - Trend Data - Mallard and Blue-winged Teal Nesting Survey - Missouri, 1953-55**

	<u>1953</u>	<u>1954</u>	<u>1955</u>	<u>Percent Change</u>
Acres of lake and marsh	4,976	4,931	7,110	+ 44
Mile of stream censused	371	581	666	+ 15
Nesting effort per square mile -				
lake and marsh	4.0	2.7	2.5	- 7
Nesting effort per mile of stream	.19	.12	.03	- 75

## WATERFOWL BREEDING GROUND AND PRODUCTION SURVEYS IN WISCONSIN,

1955

Laurence R. Jahn and Richard A. Hunt

Introduction

Since 1951, a randomized selected area type sample system has been employed to determine the trend in the Wisconsin waterfowl breeding population and in brood production. The district game managers of the five administrative State areas of the game division conducted the field work for the waterfowl surveys. Advisory help was given this group of men by personnel of the Pittman-Robertson waterfowl research project (W-6-R).

Methods and Description

Game managers used conventional ground methods for censusing the waterfowl on the selected aquatic sites. For a detailed discussion of the methods used, see past issues of Waterfowl Populations and Breeding Conditions; Special Scientific Reports or Wisconsin Wildlife Research. Only the main points of sampling system are described here.

Each game manager, except in districts 8 and 10 in game area III and district 17 in game area V was again asked to census at least 15 water areas in each district using ground survey techniques. The sites censused in 1955 were essentially the same as those sampled in 1954. Only those sites destroyed, such as through drainage, were replaced by new sites. No aerial census was conducted.

The water sites were censused once during the breeding ground survey from May 10 - 30 during regular working hours. The same water areas were covered once during the production survey from June 19 to July 3 between 4:00 and 8:00 a.m. The hour and one-half immediately preceding sunset was also used for running production surveys in a few instances.

The 20 game districts in the State were again divided into three groups. Each group had slightly different calendar dates for conducting the waterfowl surveys to correct for phenological differences.

Game managers were urged to census water sites ranging in size from one-quarter to 10 acres. In districts where such areas were scarce strips of lakes and flowages were covered. A few rivers and streams were censused in the northern part of the State.

Water areas were classified as to size and type on the first coverage. The size of a site is the estimated number of censused acres, including the zone of emergent vegetation. The water area classification included:

- A - Permanent, less than 10 acres in size.
- B - Semi-permanent (dependable except in dry years).
- C - Temporary (dry by late summer except in wet years).
- F - Flowage
- L - Lake (any permanent body of water, not streamlike, which is 10 acres or larger in size).
- S - Stream

To follow water conditions experienced during these surveys, the water levels found during the production survey were compared with the water levels found during the breeding ground survey using the following terms.

NC - No Change	L - Less Water
M - More Water	D - Completely Dry

Data on waterfowl species were recorded in the usual way. A total of 295 water sites were censused in 36 of the 71 State counties (Figure 1).

#### Weather and Water Conditions

During March the temperature and precipitation averaged below normal. Cold weather caused a slight delay in the arrival of migrant waterfowl. Temperatures in April averaged 7.5 degrees above normal, with the only warmer April on record being in 1915. Rainfall averaged 17 percent above normal in April.

The spring waterfowl migration was not spectacular, but rather was a continuous northward drift during the last twenty days of April. The only major northward exodus of migrant ducks and geese from Wisconsin was recorded on April 17 to 20.

Waterfowl nesting started about seven to 10 days earlier than in 1954, with the year 1954 being considered average for the past five-year period. Farm field work, as reported by the Wisconsin Crop Reporting Service, was also well ahead of normal by May 1.

Heavy rains which occurred in scattered localities during April caused some nest destruction of mallards. In June, Ronald Labisky of the U. S. Fish and Wildlife Service reported that heavy rains resulted in nest losses of redheads, ruddy ducks, and coots and some abandonment of mallard and blue-winged teal nests in lowlands on the Horicon Marsh National Wildlife Refuge. The extent of nest losses due to flooding is not definitely known. However, state-wide the waterfowl nest losses should have been minor, since the two main species of ducks breeding in Wisconsin, the mallard and blue-winged teal, are primarily upland nesters.

Of 295 water sites censused twice during this survey, 69 percent showed no change in water levels or more water in late June, as compared to the last 20 days of May (Table I). Compared to similar material from previous years, a considerable drop in water levels occurred during June of 1955. Accompanying the drop in water levels, luxuriant growths of aquatic vegetation choked some of the census areas making it more difficult than usual to census broods. This condition is considered in drawing conclusions on waterfowl production for Wisconsin in 1955.

Table I. - 1955 Wisconsin Waterfowl Breeding Surveys and Water Conditions on the Second Coverage.

Game Area	No. Change	Number of Water Areas Showing			Percent Showing More Water or No Change
		More Water	Less Water	Completely Dry	
I - NW	23	12	31	0	53
II - NE	46	6	2	0	96
III - WC	18	0	19	0	49
IV - EC	46	12	17	3	75
V - S	37	2	17	4	65
Total	170	32	86	7	68

#### Breeding Population Trends

The principle breeding ducks in Wisconsin are the blue-winged teal, mallard, black ducks, wood ducks, and ring-necked ducks. As can be seen in Table II, the trend in the Wisconsin duck breeding population was slightly upward as compared to the average for the period 1951 through 1954. However, as compared to 1954 all of the main species except the ring-necked duck declined in numbers, with the largest reductions being indicated in the black duck and wood duck. The coot or mud hen experienced an increase in total numbers on the study areas over the four-year average but declined slightly from the number present in 1954. Table III summarizes the breeding pair and production trends for the period 1951 through 1955.

Table II. - Wisconsin Waterfowl Breeding Pair Trends.\*

Species	Ave. Index 1951 - 1954	1954		1955		Percent Change of 1955 Index From Average	
		Index	% Lone M.	Index	% Lone M.	1954	1954
Mallard	.04	.05	45	.04	54	None	- 20
B-w. Teal	.06	.09	21	.08	38	+ 33	- 11
Black Duck	.005	.008	-	.005	-	None	- 36
Wood Duck	.006	.009	39	.006	19	None	- 33
Ringneck	.01	.01	65	.01	37	None	None
Total	.13	.18	28	.15	-	+ 15	- 17

Average of 1951 - 1954	1954	1955
Adult coot observed per acre	.04	.09
Percent Change of 1955 From	+100	-11

\* Total estimated pairs based on pairs, lone males, lone females, and unidentified duck pairs and single ducks observed. Index figures are based on the number of pairs per acre sampled.

Table III. - Comparison of Wisconsin Waterfowl Breeding Survey Figures, 1951-1955.

Year	Duck Prs./ Acre	Of Total Flocked		Young /Breed-		Average Brood Size	Indicated % Duck Prs. on Survey*
		Change	Female	Indicated % Pair	Change		
1951	.078	-	16%	1.46	-	6.5	-
1952	.092	+18%	19%	2.58	+77%	6.6	+2%
1953	.180	+96%	27%	2.35	- 9%	7.0	+6%
1954	.180	None	35%	1.51	- 36%	7.0	None
1955	.153	-15%	18%	1.88	+24%	7.4	+6%

\* Each duck pair is considered to represent a potential brood which may appear after the brood survey is completed. The percentage figure given was computed by dividing the total number of adult ducks observed on the June survey by the total estimated number of pairs on that survey.

### Results of Breeding Ground and Production Surveys

For the first time since 1951 the percent of censused water sites which were occupied by ducks during the breeding pair survey decreased. From 1951 through 1954 the percentage occupied steadily increased from 55 to 64 percent. In 1955, 55 percent of the water areas censused were occupied. The number of breeding pairs of ducks observed per acre this year was below the 1954 figure but above the average for the previous four years.

Of the flocked birds observed this year, the percent of female ducks in the flocks was the second lowest since 1951. Apparently early favorable weather conditions resulted in more females bringing off broods from first nesting attempts and gave renesting ducks ample time to start new nests. As a consequence, fewer females were forced to abandon first nesting or renesting attempts.

Complete counts on 107 broods gave an average of 7.4 ducklings per brood, the highest average brood size on record for Wisconsin. An estimated total of 495 pairs of breeding ducks produced 126 broods. Therefore, 495 pairs of ducks produced an estimated total of 932 ducklings. Indicated known duck production in Wisconsin during 1955 was 1.88 young per adult breeding pair.

Data on the average brood size of each species are summarized in Table IV. The majority of the broods were observed between June 21 and June 30, with slightly less than half falling in the Class II age category (Table V).

In addition to the regularly scheduled breeding and production surveys which were reported to the Fish and Wildlife Service by July 25, the Service requested that brood surveys be continued in August to determine how much of the annual production occurs after the deadline for the regular July report. To continue the production surveys beyond their present scope in Wisconsin is not practical when considering the number of broods observed and cost involved. However, through the courtesy of Refuge Manager Lloyd Gunther and the field work of Ronald Labisky, student assistant at the Horicon Marsh National Wildlife Refuge, some data are available on the production occurring after the July deadline on the best waterfowl producing area of the State. Table VI presents the Class Ia waterfowl broods observed during the 1954 and 1955 seasons. The indications are that about one-third of the waterfowl production can occur after the deadline date for the annual report. The actual percent occurring after the due date depends upon the phenology of the nesting season. In 1954 the season was near normal; in 1955 the nesting season was seven to 10 days early. The deadline date of July 25 for the production survey report is adequate to cover a normal or an early nesting season, but is not adequate to cover a late nesting season. However, during the past nine years only 1950 can be considered very late. It is concluded that the July 25 deadline for the brood survey is satisfactory for Wisconsin.

Broods of Canada geese raised by free-flying parents were received from six counties in Wisconsin. Areas on which goslings were produced in previous years and where young were present this year included the Suamico Game Sanctuary and the Bay Beach Wildlife Refuge (both in Brown County), the Horicon Marsh

Wildlife Area and vicinity (Dodge County), and the Central Wisconsin Conservation Area (Jackson and Juneau Counties). Areas which reported goslings for the first time this year were Lake Wisconsin (Columbia County) and a small lake in northwestern Wisconsin (Chippewa County). Reports of non-breeding adult Canada geese observed after June 1 were received from Brown, Columbia, Chippewa, Dodge, Door, Jackson, Juneau, and Vilas Counties.

### Summary

The spring waterfowl migration through Wisconsin was slightly behind schedule due to cold weather in March. With above normal temperatures and rainfall in April the northward movements of ducks and geese were rather leisurely with the only major exodus occurring on April 17 to April 20. Nesting activities began seven to 10 days earlier than normal. The hatching and rearing period experienced fairly heavy rains in early June and an extended dry period in late June and July.

Recognizing (1) that brood observations were made with low water levels existing, thereby minimizing the number of broods observed (2) that the breeding ducks per acre increased slightly over the four-year average (3) that the number of female ducks which nested in Wisconsin was higher than average (4) that the number of young per breeding pair was about average (5) that the average brood size was the highest on record and (6) that the number of potential broods predicted to hatch after the state-wide surveys were completed is the highest on record, it is concluded that waterfowl production in Wisconsin was above average in 1955.

### Summary of Summer Waterfowl Banding Operations

Two representatives of the Wisconsin Conservation Department participated in the cooperative Flyway project of banding waterfowl on the Canadian breeding grounds. No trapping or banding of ducks and coots was carried out in Wisconsin between June 15 and September 15. A breakdown of the Canada geese which were banded and released in Wisconsin is presented below.

	Adult		Immature		Total
	Male	Female	Male	Female	
Canada Geese (Wild)	5	2	-	-	7
Canada Geese (Propagated)	-	-	48	48	96
Blue Goose	1	-	-	-	1

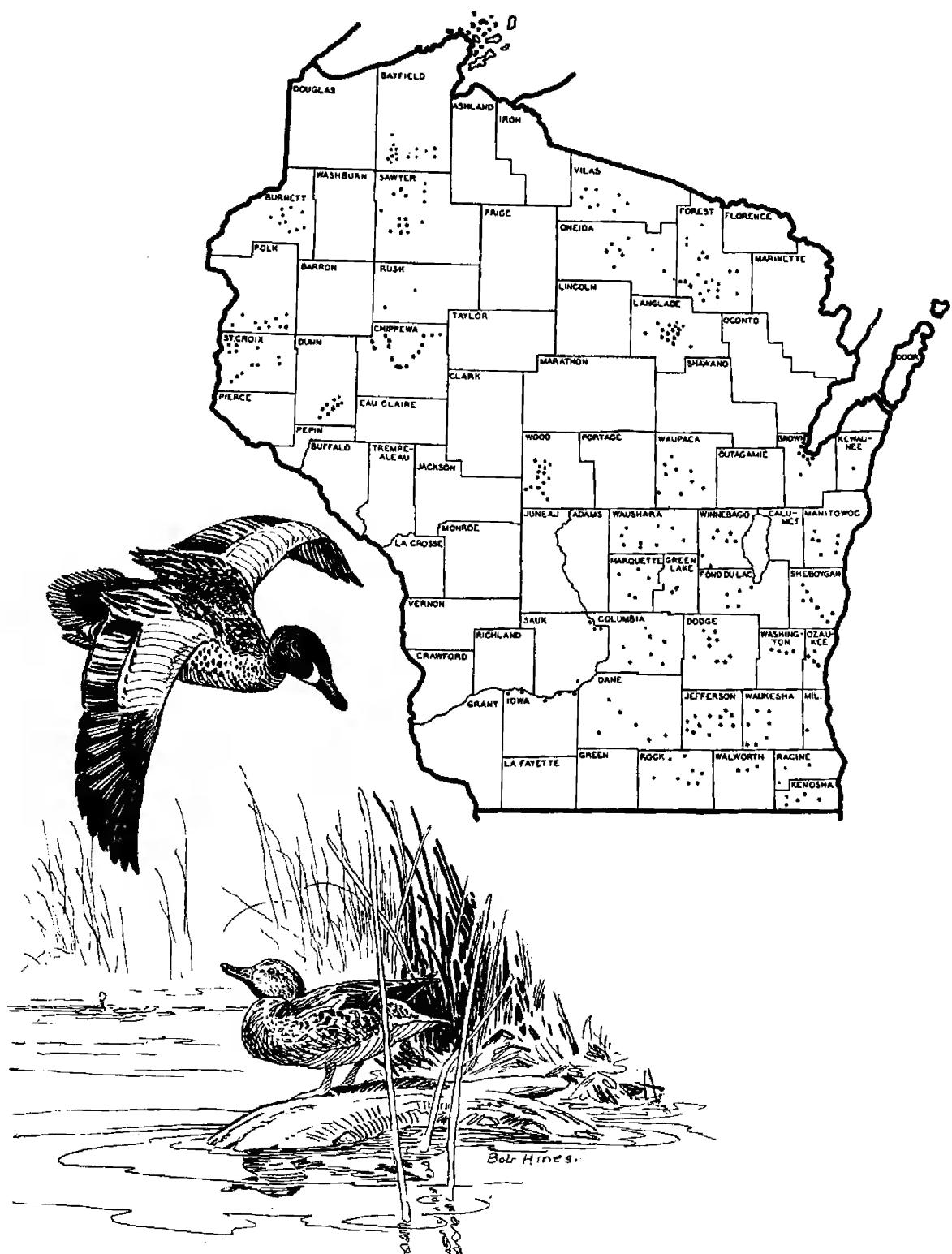
Table IV. - Summary of 1955 Brood Data - Wisconsin Waterfowl Breeding Surveys.\*

Species	Class I			Class II			Class III			Total		
	No. Broods	No. Young	Average Size									
B-w. Teal	17	138	8.1	18	127	7.0	3	9	3.0	38	274	7.2
Mallard	10	56	5.6	21	166	7.9	7	58	8.3	38	280	7.4
Black Duck	1	10	-	-	-	-	9	74	8.2	10	84	8.4
Wood Duck	4	39	9.7	6	38	6.3	-	-	-	10	77	7.7
Total Dabblers	32	243	7.6	45	331	7.4	19	141	7.4	96	715	7.4
Ringneck	2	11	5.5	4	42	10.5	-	-	-	6	53	8.8
Hood. Merg.	-	-	-	3	19	3.8	2	10	5.0	5	29	5.8
Total Divers	2	11	5.5	7	61	8.7	2	10	5.0	11	82	7.4
All Ducks	34	254	7.5	52	392	7.5	21	151	7.2	107	797	7.4

\* Complete broods only from second coverage used in this table.

Figure 1

Approximate Location of Water Areas Censused in 1955





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**Table V. - Chronology of Duck Brood Observations in 1955.**

Coverage Dates	Number of Duck Broods Observed				Total
	Class I	Class II	Class III		
May 10 - 14	0	-	-	-	0
15 - 19	0	-	-	-	0
20 - 24	0	-	-	-	0
25 - 31	5	1	-	-	6
June 21 - 25	31	23	7	61	
26 - 30	11	31	12	54	
July 1 - 5	2	5	4	11	
Total	49	60	23	132	

**Table VI. - Portion of Class Ia Broods Observed on Horicon Marsh National Wildlife Refuge after the July Production Report was Due, 1954 and 1955.\***

	No. of Broods In- cluded in Report		No. of Broods Not in Report		Percent of Total Broods Not in Report	
	1954	1955	1954	1955	1954	1955
Puddle Ducks	30	60	14	12	32	17
Diving Ducks	9	7	4	1	31	12
Coot	38	35	10	15	21	30
Gallinules	8	10	11	16	58	62
Total	85	112	39	44	31	28

\* In 1954, state-wide brood surveys were terminated on July 15 and in 1955 on July 6. These dates were used in dividing the Horicon Marsh data into two groups.

## WATERFOWL BREEDING GROUND SURVEY IN MICHIGAN, 1955

Herbert J. Miller

### Introduction

This report summarizes the results of the 1955 waterfowl breeding ground surveys in Michigan. Such investigations have been conducted for seven consecutive years by personnel of the Michigan Department of Conservation.

The purpose of these surveys is to appraise waterfowl production within the State. This is not easily accomplished as dense cover and extensive forested areas, dotted with permanent lakes, swales and beaver ponds, and traversed by a multitude of streams, typify the habitat to be censused. In such areas, breeding birds are scattered and difficult to locate. Experience has demonstrated that under these conditions there are limitations to accurate determination of waterfowl production. In view of these limitations, efforts were extended to obtain comparative indices through three types of surveys: (1) Spring migration observations, (2) Potential breeding population surveys, and (3) Brood censuses.

### Methods Used in Sampling

Both aerial and ground censuses were conducted. Approved conventional methods were used. Ground checks were made on 16 sample check areas for comparisons of spring migrants, the size of the breeding population, and the success of the breeding seasons. Coverage and techniques for ground checks have been essentially the same each year.

Aerial surveys have been altered through the years. The major changes have been in the extent of coverage, as aerial observations in the heavily forested areas proved impractical. However, comparative data for the farm lands in the southern part of the State is available.

Locations of the sample check areas and aerial transects are shown in Figure 1.

### Weather and Water Conditions

Weather conditions and water levels generally have been conducive to good production.

Mild temperatures averaging 7.6 degrees above normal prevailed through April. The U. S. Weather Bureau reports the warmest April on record. Precipitation average five percent less than normal.

Although several periods of below-normal temperatures occurred in May and June, abnormal weather that would seriously interfere with nesting or brood survival did not occur.

Swales and ponds were adequately filled with run-off water in the spring and permitted wide dispersal of the breeding population.

#### Spring Migration Observations

Comparative counts of spring migrants entering or passing through the State were obtained as an index to the numbers of potential breeders returning to the nesting grounds.

District game biologists recording observations on 16 sample check areas, reported nine of these areas to have increased numbers of waterfowl compared to 1954. Five areas were reported as having the same number and two as having fewer migrants this year.

Aerial censuses as carried on for the past six years on Saginaw Bay, Lake St. Clair, and Lake Erie during periods of peak "build-ups" of migrants were not completed. Inclement weather and unusual movements made it impractical to obtain this information.

Judging from the comparative counts on the sample check areas, increased numbers of potential breeding waterfowl entered or passed through Michigan this spring, which indicates a good carry-over of parent stock in this area.

#### Potential Breeding Population Surveys

Surveys made to determine the comparative abundance of breeding pairs indicate a favorable nesting population. On sample check areas scattered throughout the State, district game biologists found a nesting population slightly lower than in 1954 but higher than the past six-year average. The potential breeding population compared to the previous years follows:

<u>Year</u>	<u>Lineal Miles Censused</u>	<u>Potential breeders per lineal mile</u>
1949	85	6.80
1950	81	7.91
1951	120	8.18
1952	82	7.13
1953	95.5	12.75
1954	93.5	12.31
1955	111.2	11.00

These sample check areas are representative of the better type of habitat in various regions of the State.

The species composition of the potential breeding population as determined on these sample check areas was as follows:

Mallard	28.7 percent
Black Duck	27.8 percent
Blue-winged Teal	20.4 percent
Wood Duck	6.3 percent
Ring-necked Duck	4.8 percent
Merganser	1.3 percent
Pintail	1.1 percent
Unidentified	9.3 percent

Aerial transects were confined to two strips across the southern part of the State. Approximately 370 lineal miles were flown, which provides a sample covering a total of 92.5 square miles as observations were limited to one-eighth of a mile on each side of the plane (See Figure 1). The numbers of waterfowl observed were 65 in 1952, 227 in 1953, 77 in 1954, and 170 in 1955. This may indicate increased numbers of potential breeders. However, because of the great variance in numbers observed from year to year compared with our ground checks, the validity of this data may be questioned.

#### Brood Surveys

Brood censuses were made on the same sample check areas covered previously to determine potential breeding population. Information obtained from these brood censuses is used only as an index of production, since many broods are unobserved in the dense cover typical of our marshes.

Comparing the results of this year's brood census with those obtained in previous years, good production is indicated. The number of broods observed per lineal mile has been exceeded only once in the past six years. The average size of the broods was high. Comparisons are shown below.

Year	Broods per lineal mile	Hens and young per lineal mile	Bachelor ducks per lineal mile	Average size of broods observed
1949	.47	2.75	6.50	6.00
1950	.34	2.32	5.50	5.87
1951	.35	2.20	3.31	5.76
1952	.70	3.92	3.21	4.60
1953	.51	3.63	4.32	6.10
1954	.20	1.67	4.60	6.24
1955	.64	4.65	5.09	6.28

The aerial brood census route flown since 1952 was checked again this year. This route, shown in Figure 1, includes parts of the transects previously censused for breeding pairs. The sample area includes 272 lineal miles.

Observations were restricted to one-eighth of a mile on each side of the plane. This provided a coverage of 68 square miles. The results follow:

	1952	1953	1954	1955
Bachelor birds	12	7	16	28
Adult female and young	5+35	11+78	5+22	4+20
Total birds	52	96	43	52
Young per brood	7	7.1	4.4	5.0
Broods per square mile	.073	.162	.073	.059
Hens and young per square mile	.588	1.308	.399	.354
Young per square mile	.514	1.147	.323	.297
Bachelor ducks per square mile	.176	.103	2.35	4.11

Insufficient numbers of broods were observed to provide statistically significant figures. The low counts obtained suggest that aerial brood censuses should be discontinued.

#### Wood Duck Study

Special attention was given to determine the status of the wood duck. Noticeable changes in wood duck populations as reported in parts of the Mississippi Flyway have not been apparent in Michigan. Any change that may be indicated would tend toward increased numbers in the last three years.

The percent of wood ducks observed among all other nesting species on the 16 sample check areas, shown in Figure 1, indicates higher percentages of wood ducks between 1953 and 1955 than existed in 1950 through 1952, when wood ducks were considered relatively plentiful.

Brood surveys covering the same sample areas showed the highest numbers of wood ducks in 1955. A check of the occupancy of nest boxes in a special study area showed a high occupancy rate in the last three years.

Judging from these surveys, wood duck populations in Michigan are as high, or higher, compared to the past five years.

#### Summary

1. Comparative counts on 16 sample check areas indicate that increased numbers of potentially breeding waterfowl entered or passed through Michigan this spring. A good carry-over of breeding stock was apparent.

2. Surveys to determine resident breeding populations indicate breeding pairs were present in numbers slightly lower than 1954 but above the six-year average.

3. Nesting conditions were considered favorable for production.

4. Brood surveys indicate increased numbers of broods compared to the past six-year average, with good survival indicated by the average number of young per brood.

5. Judging from the results of the various surveys, Michigan had a year of favorable waterfowl production.

Figure 1



LEGEND

- Ground surveys on sample check areas
- Aerial transects for censusing breeding pairs
- ..... Aerial transects for censusing broods

## WATERFOWL BREEDING GROUND SURVEY IN INDIANA - 1955

Dale N. Martin

### Introduction

This is the seventh consecutive year Indiana has cooperated with the U. S. Fish and Wildlife Service in conducting a waterfowl breeding ground survey. With minor exceptions, all data obtained prior to June 30 were collected by former Study Leader James D. Mc Call. The portion of the 1955 breeding ground survey included in this report is confined to wood duck brood production on 143 miles of stream transects, and to water conditions in the pothole nesting habitat in northern Indiana. Brood census techniques have been essentially the same for the past three years and have been described in the 1953 report.

In total, 91 wood duck nesting boxes have been inspected for usage.

The study leader was assisted at various times by conservation officers and Pittman-Robertson personnel.

### Weather and Water Conditions

Average spring temperatures in 1955 were erratic; February temperatures were cold during the first half and unseasonably warm during the second, while March was the reverse of temperatures in February. April temperatures were far above normal; May above normal; and June though not excessively so, was the coldest June in many years.

River stages during May and June were slightly above normal to normal throughout the State except for the mid-June flood stage in the Iroquois River watershed.

April and May precipitation in the lake and pothole region in northern Indiana was one-half to one and one-half inches below normal. This deficiency was not considered detrimental to brood production, however, as unprecedented rains of October 1954, and near normal precipitation in the winter months, had left our brooding habitat in good condition. By July 1, some of the wetland areas were beginning to show the effects of deficient rainfall, but general and frequent rains between July 5 and 15 restored them to normal levels.

Eighteen wetland study areas were inspected for water levels between July 5 and 15 and were considerably improved over conditions found one year ago. Of the sixteen areas considered potential brooding areas, and normally expected to have sufficient surface water at this time of year, five were above normal, nine at normal levels, and two below normal. None of these were dry. Of 17 areas inspected one year ago, none was found to be above normal, seven were at normal levels, five below normal, and five were dry.

### Wood Duck Brood Production

The preliminary brood survey conducted between May 3 and 16 on three transects totaling 47 river miles, (Figure 1) indicated that the adult male wood duck population was about eight percent below, and the adult female population about 34 percent below the 1952-53 averages for the same transect.

The 143 river miles in the nine transects floated this year during brooding were the same as those covered in 1954. An all-time low of 56 broods of wood ducks was observed, for an average of 39.2 broods per 100 miles of transect. The average is 37 percent below the figure for 1954, and about 40 percent below the previous three year average.

Whole counts were obtained on 32 wood duck broods. The average young at the time of observation was 8.6, and numbers ranged from 2 to 14. This average brood size and the 39.2 broods per 100 miles, gives 337 young per 100 miles (Figure 2). Compared with the previous four years, the brood size in 1955 was 0.8 bird above the average.

Since only two broods of wood ducks were observed during the preliminary survey, from the distribution of age classes given in Table I, and from information gained through follow-up floats on three transects, it is concluded that the regular nine transects were inventoried during the period when a maximum number of broods could be observed.

Standard wooden type wood duck nesting boxes on the Willow Slough State Game Preserve were inspected this year on July 7 and 8. Two of the 67 boxes were determined to be unsuitable for nesting. Five of the 65 serviceable boxes held evidence of successful clutches, compared with 6 of 65 in 1954. All five successful boxes this year were located over open water.

On August 15, 14 metal "Predator proof" nesting boxes were inspected. These boxes were erected along the Big Blue River in Shelby and Hancock Counties on March 2, 1955. There was no evidence of wood duck nesting.

An additional 10 metal type boxes, erected at Jasper-Pulaski State Game Preserve on February 19, 1955, were inspected on August 26. Two of these nesting boxes held evidence of successful wood duck clutches.

### Summary

Water levels during the brooding period were determined to be good, and considerably improved over conditions one year ago.

The preliminary river transect survey indicated the numbers of both adult male and adult female wood ducks had declined, eight percent and 34 percent respectively, compared to the average of comparable data for the years 1952-53.

Table I. - Wood Duck Broods Observed by Sections, Transects, and Age Classes, Compared with 1954  
and Previous Three-Year Average.

Arbitrary Section of State	River Transect	Length, Date Miles Floated	Brood Age Classes (1)						Total Broods		% Change, 1955 From Previous 3-Year Average	
			I			II			1955 1954			
			a	b	c	a	b	c			Transct Section	
NORTH	Maumee	15	6-14	1			1			2	8	(2) - 75
	Elkhart	17	6-17		2		3			1	6	2.3
	Iroquois	14	6-30	2	1		1			4	2	+ 8
	Sub-Total	46	6-14 6-30	3	3		4	1		1	12	10
CENTRAL	Mississinewa	13	6-18	1	1		3	2	1	1	9	7.3
	Big Blue (Shelby)	12	6-1							0	10	11.0
	West Fork White	25	6-2	2	1	7	7	3		20	25	(3) + 23
	Sub-Total	50	6-1 6-18	3	2	7	10	5	1	1	29	42
SOUTH	Muscatatuck	19	5-25		4		5	1		10	24	30.7
	Salt	15	5-24	1		1	2			4	3	4.5
	Eel (Clay)	13	6-3				1			1	10	(2) - 11
	Sub-Total	47		1	4	1	7	2		15	37	9.3
STATE	GRAND TOTAL	143	5-24 6-30	4	9	11	21	8	1	2	56	89
												93.1
												- 40

NOTE: (1) Used pintail age classes, from Gollop and Marshall, May 1954.

(2) Two-year average only, 1953-54, Maumee and Salt.

(3) Adjusted for shorter transect, 1952, Muscatatuck and West Fork of White River.

Nine river transects, totaling 143 river miles, were censused for production trends. An all-time low of 56 broods of wood duck was observed, for an average of 39.2 broods per 100 miles of transect. Broods observed per 100 miles are 37 percent below the figure for 1954, and about 40 percent below the previous three-year average. Brood size ranged from 2 to 14, and averaged 8.6. Compared with the previous four years, brood size was 0.8 bird above the average.

In total, 89 serviceable wood duck nesting boxes were inspected for evidence of successful clutches. Seven of these boxes were considered successful, compared to 6 of 65 boxes inspected last year.

WATERFOWL BREEDING GROUND SURVEY, INDIANA, 1955

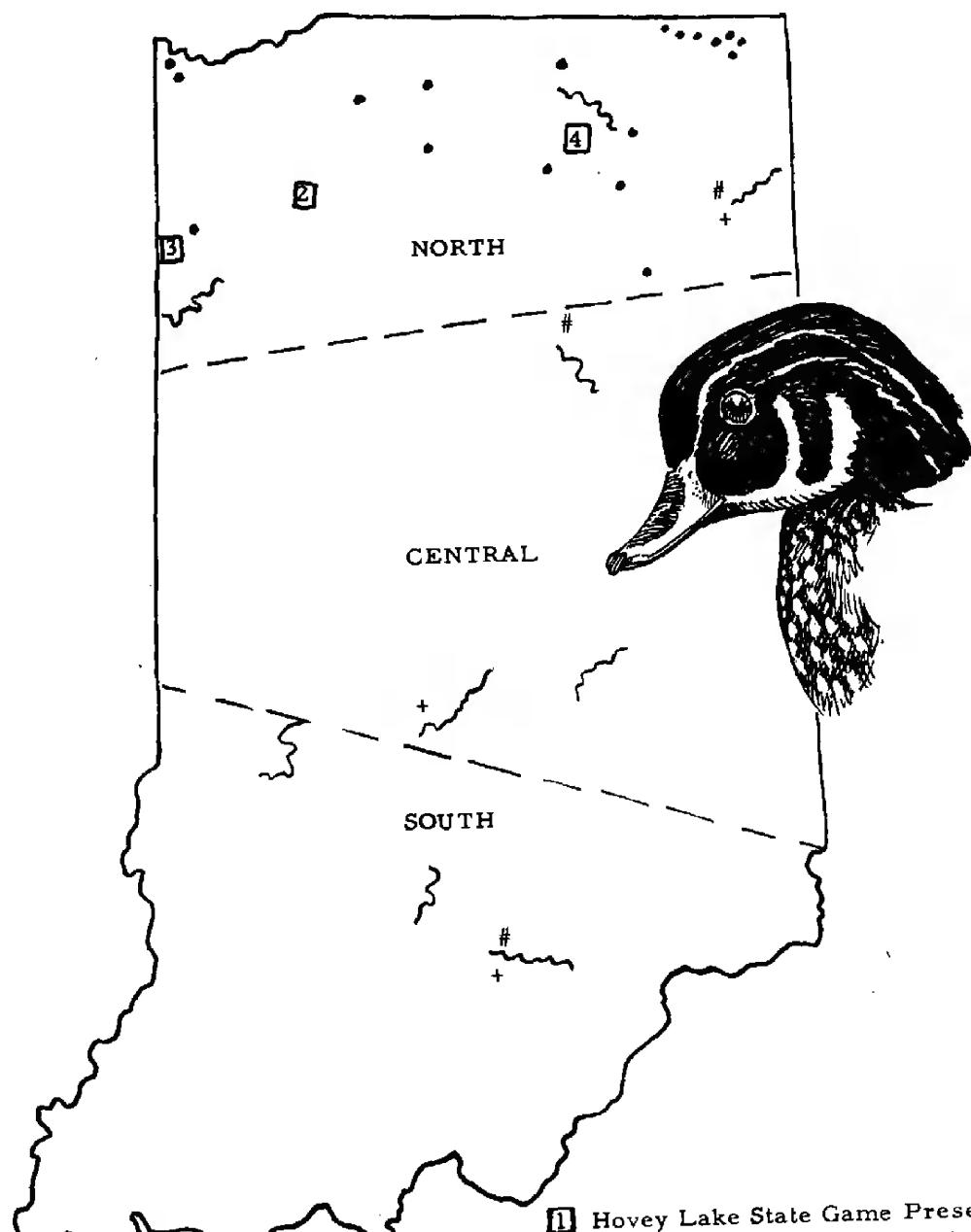
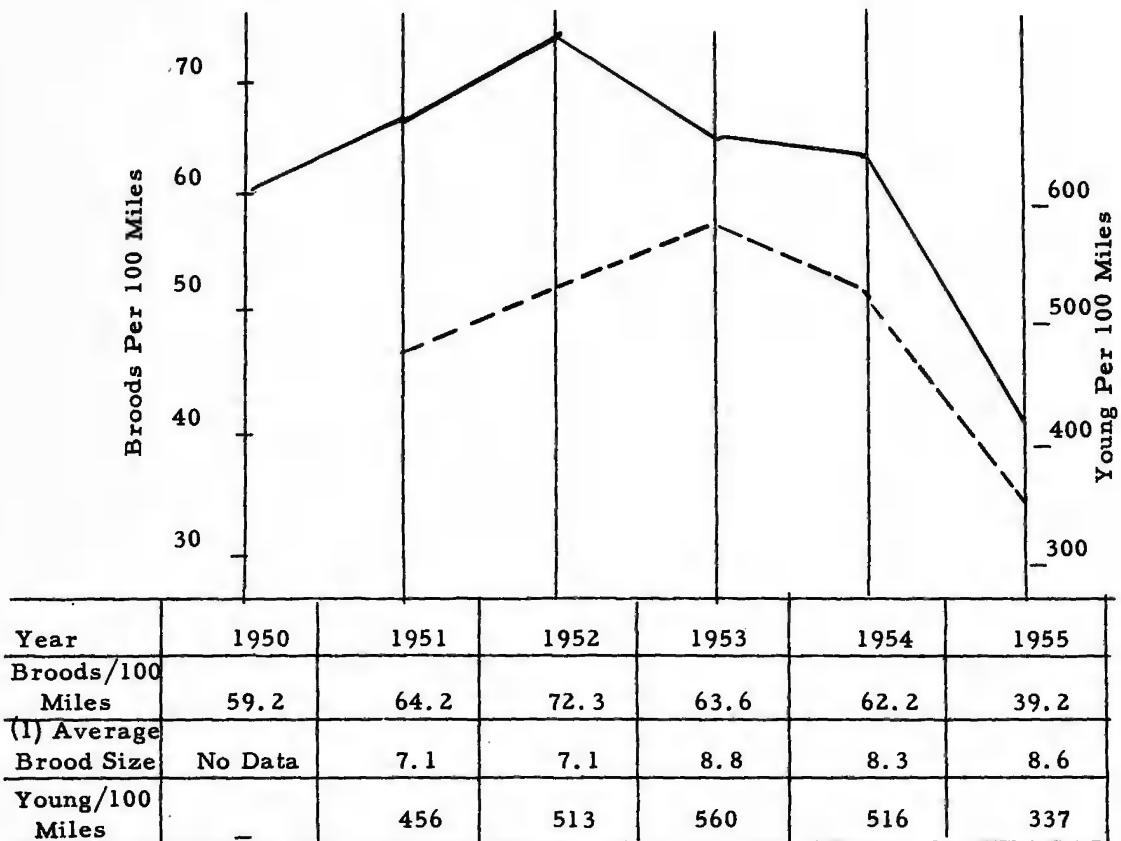


Figure 1

- 1 Hovey Lake State Game Preserve
- 2 Jasper-Pulaski "
- 3 Willow Slough "
- 4 Tri-County "

Stream Transects  
• Water Level Check Areas  
# Preliminary Transects  
+ Follow-up Transects

**WOOD DUCK BROODS AND YOUNG PER 100 MILES  
OF COMPARABLE STREAM TRANSECTS, INDIANA, 1950-1955**



NOTES: (1) Determined from whole counts only:

— Broods per 100 miles of transect.

— Young per 100 miles of transect.

Figure 2.

**WATERFOWL BREEDING GROUND SURVEY - OHIO  
1955**

Delmar E. Handley

Methods and Coverage

Breeding pair surveys were conducted through the Lake Erie marshes by aerial transects, at the Magee Marsh Wildlife Area by boat and foot and on 107 linear miles of streams by float trips. The aerial transects and the float trips were conducted twice, once during April and again in May. The surveys at Magee Marsh were made periodically throughout the spring by the area manager.

The brood surveys were made at Magee Marsh, Delaware Reservoir and the 107 linear miles of streams. The surveys at Delaware Reservoir and Magee Marsh were made throughout the spring and summer months. The stream float trips were run once during the latter part of June.

Weather and Water Conditions

Weather and water conditions, with the exception of the Lake Erie marsh area, were in general favorable to waterfowl production in Ohio during 1955. In northern Ohio spring storms, particularly the storm of May 14, inundated much of the Lake Erie marshes effecting a heavy loss of nests and eggs. The inland lakes and streams were about normal and favorable to waterfowl production.

Following are the findings from those areas under observation during the spring and summer of 1955.

Table I. - Aerial Breeding Pair Survey - Lake Erie Marshes (80 linear miles)

Species	Pairs		Pairs/Sq. Mi.		Percent Change
	1954	1955	1954	1955	
Mallard	71	83	7.1	8.3	+ 17
Black duck	91	79	9.1	7.9	- 13
Blue-winged teal	11	10	1.1	1.0	- 10
Wood duck	5	6	.5	.6	+ 20
Total	178	178	17.8	17.8	None

**Table II. - Waterfowl Breeding Pair Survey - Magee Marsh (1,960 acres)**

Species	Pairs		Pairs Per Sq. Mi.		Percent Change
	1954	1955	1954	1955	
Mallard	27	24	8.71	7.74	- 11
Black duck	13	6	4.19	1.94	- 54
Blue-winged teal	9	7	2.90	2.26	- 22
Wood duck	8	21	2.58	6.77	+163
Green-winged teal	1	-	.32	-	-
Canada Goose	-	1	-	.32	-
Total	58	59	18.71	19.03	+1.72

**Table III. - Waterfowl Breeding Pair Survey - Streams \***

Species	Pairs		Pairs Per Sq. Mi.		Percent Change
	1954	1955	1954	1955	
Wood duck	151	64	1.29	.60	- 53
Mallard	24	11	.21	.10	- 52
Black duck	1	1	.01	.01	None
Blue-winged teal	2	1	.02	.01	- 50
Total	178	77	1.53	.72	- 53

**Table IV. - Waterfowl Brood Survey - Delaware Reservoir Area \*\***

Species	No. Broods		Acre of Water		Percent Change	Young/Brood		Percent Change
	1954	1955	1954	1955		1954	1955	
Wood duck	7	22	.33	1.05	+214	6.4	7.7	+ 20
Mallard	14	12	.66	.57	- 15	6.4	8.1	+ 27
Blue-winged teal	6	2	.29	.09	- 67	6.5	7.1	+ 9
Black duck	1	1	.05	.05	None	4.0	4.0	None
Total	28	37	1.33	1.76	+ 31	6.1	7.7	+ 26

\* 117 linear miles surveyed during 1954, 107 linear miles surveyed during 1955. Different areas surveyed during 1954 and 1955.

\*\* Del. Reservoir Area consists of a 1,200 acre lake plus 42 small ponds, averaging 1/2 acre in size, located on a 7,000 acre public hunting area. Brood data above is from the 42 ponds only.

Table V. - Waterfowl Brood Survey - Magee Marsh (1,960 acres)

Species	No. Broods		Brds./Sq. Mi.		Percent Change	Yng./Brood		Percent Change
	1954	1955	1954	1955		1954	1955	
Wood duck	3	12	.98	3.92	+300	5.8	6.3	+ 9
Mallard	9	4	2.94	1.31	- 55	4.3	7.1	+ 65
Black duck	10	3	3.27	.98	- 70	6.7	6.1	- 9
Blue-winged teal	5	3	1.63	.98	- 40	5.2	6.0	+ 15
Total	27	22	8.82	7.19	- 19	5.5	6.4	+ 16

Table VI. - Waterfowl Brood Surveys - Streams (107 linear miles)

Species	No. Broods		Brds/linear Mi.		Percent Change	Yng./Brood		Percent Change
	1954	1955	1954	1955		1954	1955	
Wood duck	33	33	.284	.336	+ 18	7.1	7.3	+ 3
Mallard	3	3	.023	.028	+ 22	5.8	7.1	+ 22
Black duck	1	-	.008	-	-	7.0	-	-
Total	37	36	.315	.364	+ 16	7.06	7.27	+ 3

Table VII. - Wood Duck Nest Box Checks

Area of Inspection	No. Boxes Checked		No. Boxes Used		% of Utilization	
	1954	1955	1954	1955	1954	1955
District #2	35	76	12	26	34.29	34.21
District #3	103	113	17	25	16.50	22.12
District #4	193	316	13	32	6.74	10.13
District #5	99	259	11	36	11.11	13.90
District #6	91	152	22	23	24.18	15.13
Magee Marsh	185	185	7	21	3.78	11.35
Delaware Dam	70	77	10	24	14.29	31.17
Woodbury Area	19	19	14	14	73.68	73.68
Van Camp	85	88	30	21	35.29	23.86
Total	880	1,285	136	222	15.45	17.28

Summary

In the Lake Erie Marsh region there was an increase of wood duck broods with a decrease in mallards, black ducks and blue-winged teal. A fairly substantial increase in the average brood size was discovered.

The stream surveys indicated an increase in the number of wood duck and mallard broods with a slight increase in the average brood size.

At the Delaware Reservoir area in Central Ohio an increase was noted in the number of wood duck broods with a decrease in the mallards and blue-winged teal. A substantial increase was noted in the average brood size.

The wood duck nest box checks indicated about a 12 percent increase over last year in the degree of utilization.

It would appear that state-wide there was a definite increase in the wood duck populations with a decrease in the mallard, black duck and blue-winged teal production.

WATERFOWL BREEDING GROUND SURVEY AREAS - OHIO, 1955





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## WATERFOWL BREEDING GROUND SURVEY IN NEW YORK, 1955

Dirck Benson, Donald Foley and Donald Schierbaum

### Introduction

Data indicative of the 1955 waterfowl production in New York have been collected through four methods. These include ground surveys, banding studies, aerial transect flights, and canoe sampling in the Adirondacks.

### Ground Surveys

Breeding ground survey of sample areas by ground observers in New York is partially summarized elsewhere in this report in Schuler's article on the Northeastern States. In addition, during the rearing season 186 man-made, wildlife marsh units which averaged five acres in size were studied. Table I presents these observations in comparison with the 1953 and 1954 records.

Table I. - Comparison of Broods Observed Per Marsh Unit in 1953, 1954 and 1955 in New York.

Year	Units Surveyed	Broods Observed Per Unit					Total
		Black	Mallard	Wood	B-w. Teal		
1953	81	0.26	0.56	0.75	0.12		1.69
1954	181	0.23	0.39	0.53	0.06		1.21
1955	186	0.36	0.45	0.63	0.07		1.51

These data do not indicate any marked changes from 1953, and, since in 1954 it was concluded that the apparent differences were due to water level conditions, it must be concluded that about equal production has occurred on the wildlife marshes and the nearby swales and potholes over the last three years. Put in terms of acres this is a production of 25 to 30 broods per 100 acres compared with the less than 10 broods per 100 acres which have been observed on the large marsh areas of the State. These are all minimum estimates since the majority of the areas were subject to extensive not intensive coverage.

### Banding Studies

The only summer trapping studies carried out this year which have a direct bearing of brood production were done on seven areas in western New York. In 1954 an average of 5.7 broods per area was estimated through aging based on plumage development of the flightless young which were taken. In 1955 these same seven areas showed an estimated 7.5 broods per unit. Since the samples were small and water levels were lower than in 1954, the difference cannot be considered significant and may logically represent earlier movement in 1955 from the neighboring swales and potholes to the larger and more stable wildlife marshes. In using the term "broods per unit" it should be noted that no attempt was made to separate the resident broods from those which were passing through.

### Production

The fifth consecutive aerial waterfowl production survey was flown during July 5 to 13, 1955. The coverage was much modified this year from previous flights, the attempt being made to collect more data by following water-courses rather than arbitrary cross-country transect lines, although notes were also kept on the overland segments between streams. A total of 936.5 miles was flown following waterways, while the overland mileage amounted to 1074.4. The flying was again done by the same personnel, John Schempp and Ed. Maunton. The methods used were similar to those described in previous reports (1953, 1954).

Direct comparisons with figures of earlier years are risky because of changes made in both amount and location of coverage each year, but the data are listed in Table II for completeness.

On the basis of these figures it appears that 1955 was a more favorable year for waterfowl production in New York than was the average since 1951. However, we must use these figures with caution due to their known variability, and also because of the very dry nesting and rearing period this year. Because of water level reductions, the birds may have been more visible this year than normally, even though a population reduction might have taken place.

In the above table only the comparable overland transect segments were included. While the stream-course data provided even high densities in all strata, they could not be compared to any figures more recent than 1953. In this respect, however, 1955 appeared extremely favorable, but again this could easily have been the result of the very low water levels.

Average brood size this year was 7.0 with 46 broods observed, the figures for former years are: 1951, 5.2 (90); 1952, 5.5 (33); 1953, 5.7 (94) and 1954, 5.7 (48).

**Table II. - Aerial Transect Census of Waterfowl Production in New York, 1951-1955.**

Type	Year	Waterfowl Observed		Production Index*	
		Per Linear Mile		Broods	Pairs
Allegany	1951	0.10	0.06	1892	1135
	1952	0.01	0.03	189	568
	1953	0.014	0.10	251	1792
	1954	0.038	0.038	681	681
	1955**	0.105	0.131	1886	2358
Beech-Maple	1951	0.14	0	788	0
	1952	0.14	0.21	788	1182
	1953	0.38	0.12	3767	1189
	1954	0.162	0.115	1606	1140
	1955**	0.240	0.162	2379	2081
Oak-Chestnut	1951	0	0	0	0
	1952	0.27	0	1452	0
	1953	0.48	0.22	2582	1183
	1954	0.347	0.104	1867	559
	1955**	0.081	0.201	435	1080

\* Obtained by calculating as shown in report for 1953.

\*\* On overland portions only; stream-course portions gave higher densities but would not be comparable.

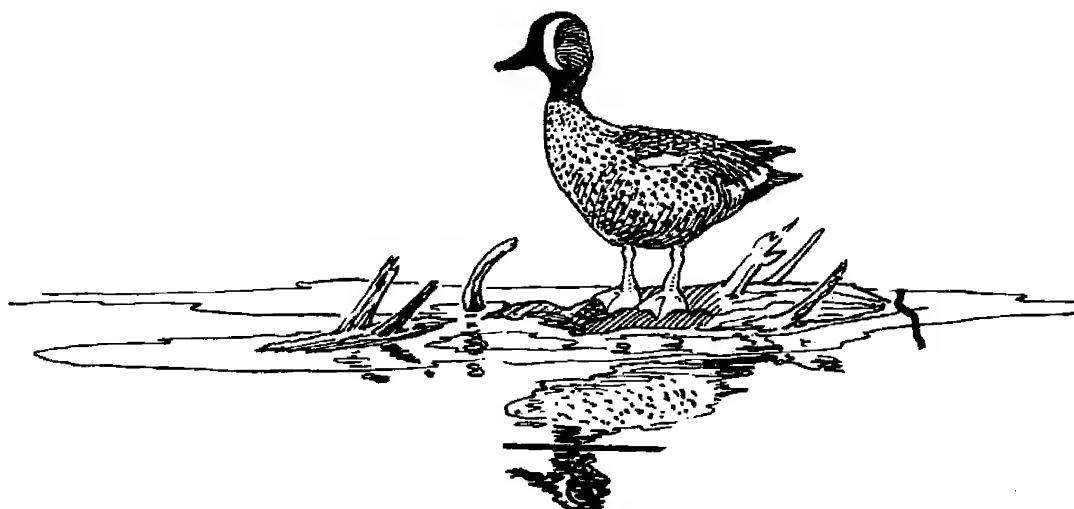
#### Brood Survey

The canoe brood census work was confined to the Adirondacks this year since time was limited. This permitted only a few comparisons with last year, but a better over-all view of the extent of the habitat used by ring-necked ducks was obtained. There seemed to be some slight reduction in production this year from last in the areas of comparable coverage, but over the total 26 miles there was observed an average of 1.27 broods per linear mile of waterway, which continued to indicate a substantial population in the Adirondacks. Ring-necked ducks are now known to breed at various sites within a 400-square mile roughly bounded by Inman, Paul Smith's Tupper Lake and Saranac Lake. Most of this area lies within Franklin County. Odd reports of ring-necks breeding outside this territory either were unfounded or were not thoroughly investigated.

Average brood size by this method, and where 56.3 percent were ring-necks, was 5.2 for 32 broods. The 18 ringnecked broods averaged 6.1 at about two and one-half weeks of age.

### Summary

Four types of brood production data were obtained in 1955 in New York. These included ground surveys on wildlife marshes, banding of flightless young on wildlife marshes, aerial transect flights and canoe sampling in the Adirondacks. In no case did these data indicate any substantial change from 1953 and 1954. The differences which were observed could nearly all be assigned to weather factors and water levels.



## WATERFOWL BREEDING GROUND SURVEY IN DELAWARE

1955

Everett B. Chamberlain

### Introduction

This report summarizes the results of the 1955 waterfowl breeding studies in Delaware. This work has been conducted annually for the past several years by personnel of the Federal Aid Division of the Delaware Game and Fish Commission. This year, as usual, the work was under the direction of the writer. However, since he was in Labrador for the summer, the aerial transects were flown by Mr. Bain of the U. S. Fish and Wildlife Service, with Henry Cofer of Delaware as observer. Courtland Smith of Ellendale, Delaware, did the work on the ground study area at Primehook Neck.

### Methods Used in Sampling and Area Covered

As in previous years both intensive ground coverage and aerial transects were used. However, as in 1954, a shortage of personnel and the pressure of seasonal work made it impossible to cover all of the areas that were formerly designated as permanent ground study areas. For that reason only the area at Primehook Neck, which has been used since 1951, was covered this year.

Aerial transects, based on ecological types, on the pattern worked out by the Waterfowl Biometry Office at Patuxent Research Refuge, were run again this year.

### Weather and Water Conditions

Weather and water conditions were essentially the same as in 1954 with very little precipitation throughout the breeding season, except that the extreme drought of early 1954 was not repeated in 1955. There were no other unusual climatalogical conditions and, in contrast to the 1954 breeding season, the drought seems to have had no effect on brood production.

### Success of the Season

It was observed last year that the severe early drought probably was the reason so few broods were seen at the time the aerial transects were flown. This observation is substantiated by the fact that this year, with the dry weather coming a little later in the season, seven broods were seen, as opposed to two

in 1954. These figures are shown in Table II. What the table does not show is that in 1954 the transects were flown three times and only four broods were seen while in 1955, with only one flight over the transects, seven broods were seen. Table II also shows much better brood success for 1955. There were also more young and larger average broods for both black and wood ducks, although the number of broods of blacks was below one five-year average.

#### Banding Operations

As noted in the introduction the writer, who is also in charge of banding, was in Labrador all summer. Therefore, there was no summer banding in Delaware this year.

Table I. - Five Year Record of Brood Production - Primehook Study Area.

Species	Number Broods					Number Young				
	1951	1952	1953	1954	1955	1951	1952	1953	1954	1955
Black	12	15	16	11	12	84	96	107	67	99
Wood	1	5	1	2	7(2)	6	32	2(1)	13	56(2)
B-w. Teal	1	2	-	-	-	8	14	-	-	-

	Average Brood				
	1951	1952	1953	1954	1955
Black Duck	7.0	6.7	6.7	6.1	8.25
Wood Duck	6.0	6.4	-	6.5	8.0(2)
Blue-winged Teal	8.0	7.0	-	-	-

**5-years Average:**

Black	13.2	90.6	6.86
Wood	3.2	21.8	6.81

(1) Incomplete Brood

(2) These figures do not include one brood of four, designated as incomplete.

**Table II. - Aerial Transects by Ecological Types, Delaware, 1954 and 1955 -**  
**Estuarine Marsh, Unditchcd (154 Miles).**

	Black			Mallard			Wood Duck		
	B	P*	G	B	P	G	B	P	G
July, 1954	1 ( 7 )	24	329			35			
July, 1955	5 (28)	11	136	1	30		1		
<b>Estuarine Marsh, Ditched (8 Miles)</b>									
July, 1954	1 ( 6 )	-	-						
July, 1955	2 (12)	3	24						

**Coastal Marsh, Ditched (16 Miles)**

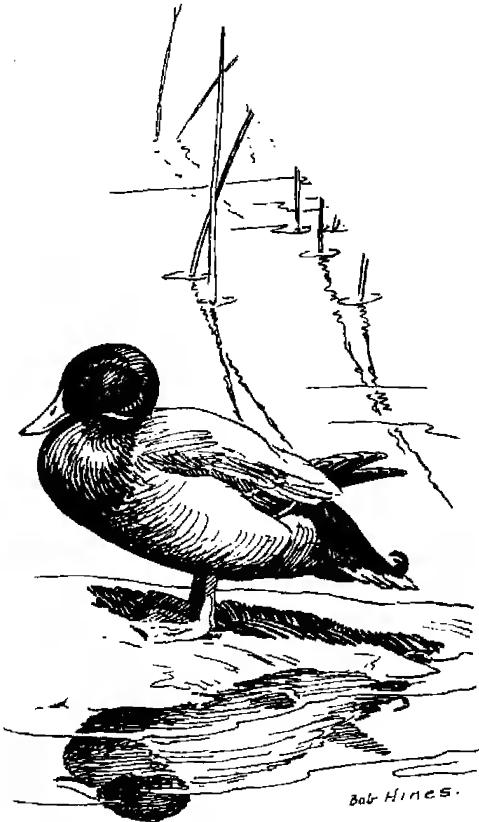
July, 1954	-	4	12
July, 1955	-	1	5

B - Brood

P - Pair

G - Group

\* - Singles tabulated as pairs.



## WATERFOWL BREEDING GROUND SURVEY IN NEW JERSEY, 1955

Paul D. McLain and F. Ferrigno

### Introduction

The annual aerial and ground surveys of waterfowl production on established census areas was conducted in essentially the same manner as in previous years. Aerial counts were made on the two important strata of the State, ditched and unditcheted tidal marsh; whereas, ground observations were made on the tidal marsh of Egg Island and the six impoundments at Tuckahoe. Census work on these study areas was carried on by personnel of Pittman-Robertson waterfowl investigational project, W-16R-9.

### Water Conditions

Even though the rainfall for May and July was far below normal, drought conditions were not as severe as during the previous year. Consequently, water levels within the impoundments were considerably higher and for a longer period than 1954. Precipitation continued above normal through most of June, with several abnormally high tides inundating the tidal marshes.

### Aerial Census

A summary of the 1955 aerial flights over ditched and unditcheted tidal marsh as compared to similar flights in 1954 is presented in Table I. It is apparent from this data, that there was no change in the number of broods observed on the unditcheted strata. However, the total number of young produced was much higher in 1955 because of an increase in the average brood size. The results from the unditcheted strata shows a reduction of one brood.

Table I. - Results of Aerial Transects on Ditched and Unditcheted Tidal Marshes.

Date	Strata	Sq. Mi. Strata	Sq. Mi. Sample	Total Broods	Average Brood Size	Total Young
July 18, 1954	Ditched	219	8.5	3	5	15
	Unditcheted	108	9.3	10	4.2	42
July 20, 1955	Ditched	219	8.5	2	-	-
	Unditcheted	108	9.3	10	4.8	48

Ground Census

The results of the Egg Island strip census method, with five personnel covering a one-quarter mile wide transect, three miles in length, are listed in Table II. The production of both gadwalls and black ducks for 1955 showed a tremendous decline as compared to production in 1954. In 1955, there was a decrease of 10 black duck broods and five gadwall broods.

It is felt, however, that this census was conducted too late, and undoubtedly a considerable number of broods were missed. The fact that no nests were found and that all broods were age Class III, indicates that early nesting attempts were very successful and some broods were probably already on the wing. Next year, at least two censuses will have to be conducted.

Table II. - Brood Survey on the Egg Island and Tuckahoe Areas.

Species	Total Broods		Average Brood		Young Produced	
	1954	1955	1954	1955	1954	1955
<u>Egg Island, Cumberland County</u>						
Black Duck	17	7	4.2	-	71.4	-
Gadwall	7	2	4.2	4.5	29.4	9.0
Unidentified	1	0	3	-	3	-
<u>Tuckahoe-Corbin City, Cape May &amp; Atlantic Counties</u>						
Black Duck	12	6	6.4	9.6	76.8	57.6
Mallard	2	0	7.0	-	14	-
Wood Duck	2	2	-	-	-	-

Data (Table II) from the Tuckahoe-Corbin City impoundments also indicated a sizable decrease in brood production. A comparison of the two years, showed a reduction of six black duck and three mallard broods in 1955.

Broods on the Tuckahoe area were recorded throughout the brood season by several different methods. However, the best results are usually obtained by early morning counts. Even with this method, it was feared that some broods were overlooked for fear of duplication. The bulk of the waterfowl production occurred during the beginning of May with brood size and age class, in most areas, being identical. The average brood size of nine young is probably the highest recorded at Tuckahoe and was attributed to higher water levels.

### Conclusions

In considering all aspects of the presented data, the over-all outlook appears to be a decrease in waterfowl production. Nevertheless, field data was not sufficient and production may not be as low as it appeared to be. On the other hand, the data does indicate that during 1955 early nesting attempts were very successful and brood survival was excellent.

### The Colliers Mill-Success Lake Area

#### Introduction

The waterfowl breeding ground survey on the inland freshwater lakes and ponds in the Collier's Mills area was conducted during the spring and summer of 1955. The purpose of this study was to determine the initial nesting dates, nest losses, brood size and brood survival on 16 managed lakes and ponds in the northern section of Ocean County, New Jersey. This study was conducted as a segment of Pittman-Robertson Project W-28-R.

#### Sampling Method

The technique for locating broods and studying brood survival was standarized during the past five years of this study. It was felt that bi-weekly ground observations on the 16 lakes and ponds was the most practical method of locating broods. Due to the heavy cover in the form of standing trees and brush in the ponds it was not possible to observe an entire pond. Thus frequent visits were necessary during the spring and summer to indicate the production of each pond.

#### Weather and Water Conditions

Temperatures during April and May were slightly colder than experienced during 1954. No freezing weather was encountered or heavy frosts observed. June and July were above normal in temperature and August was slightly colder than normal for that month.

The water levels in all ponds were at maximum during April and May. Unfortunately a prolonged drought during June, July and early August caused the water levels in all ponds and lakes to drop from four to 11 inches, reducing the water areas of the ponds. However, no detrimental effect was observed on the brooding conditions and there appeared to be no ill effect on the annual production.

A hurricane which struck the New Jersey coast on August 12 resulted in a six inch rainfall in less than 24 hours. The water levels which were low at this time rose in four hours and all ponds carried the maximum amount of water due to heavy run-off of water. Most of the broods were on the wing at this time and no mortality was thought to have occurred due to heavy rains and high winds.

#### Breeding Population Trends

The final results of the bi-weekly observations during the spring and summer of 1955 are shown in Table I. The table also shows a yearly comparison of the species, number of broods, and average brood size observed in the Collier's Mills area during the period from 1951 to 1955.

Broods of five black ducks and one mallard were found during 1954 and 1955. It was thought that the production of these species was approximately the same both years. The wood duck, which amounted to two broods in 1954, showed an increase of one brood during 1955.

The average brood size for all three species increased during 1955. This increase can be attributed to finding most of the broods during late May and early June when they were in age Class I and before natural mortality had taken its toll. The average brood size would probably have been less had the broods been observed late in the summer.

#### Summary

1. The waterfowl breeding ground survey was conducted during 1955 at the Collier's Mills-Success Lake area in Ocean County, New Jersey. Bi-weekly ground observations on the 16 managed lakes and ponds was the technique employed to locate broods during the spring and summer months.

2. The weather was thought to have been favorable for waterfowl production and although a prolonged drought was experienced during June, July, and early August, no serious effect was observed on the waterfowl breeding areas. Likewise, a hurricane which occurred during August, causing flooding and high water levels appeared to have no detrimental effect on the annual production.

3. The total waterfowl production on the area was nine broods during 1955. Black ducks amounted to five broods and mallards one brood during 1954 and 1955. Wood ducks increased from two broods in 1954 to three broods during 1955. There was an increase in average brood size for all species during 1955, but it was felt that this increase was due chiefly to locating the broods earlier in the spring during 1955 while they were in age Class I, and before they had been subjected to the elements and natural enemies for any length of time.

4. The waterfowl breeding conditions and annual production of waterfowl appeared to be about the same during 1955 as it was in 1954, for black ducks and mallards. The wood ducks showed an increase, but due to the small numbers of nesting wood ducks in this area, it is difficult to determine if this was a local increase or a general population trend in this area of New Jersey.

Table I. - Summary of Waterfowl Production Data Obtained at Collier's Mills - Success Lake Area, Ocean Co., New Jersey from 1951-1955.

Species	No. Brds. Obs.			No. Brds. Obs.			No. Brds. Obs.			No. Brds. Obs.		
	Avg. Size			Avg. Size			Avg. Size			Avg. Size		
Black Duck	2	5.0		4	4.7		4	6.2	5	7.0	5	7.6
Wood Duck	6	5.5		3	4.3		2	6.0	2	6.5	3	8.3
Mallard	-	-		1	4.0		2	7.0	1	5.0	1	6.0
Total Number Annual Broods	8			8			8			9		

## WATERFOWL BREEDING GROUND SURVEY - MAINE

1955

Howard L. Mendall

Introduction

This report summarizes the results of the 1955 waterfowl breeding ground studies in Maine. These investigations are conducted annually by the personnel of the Maine Cooperative Wildlife Research Unit under the supervision of the writer. In 1955 he was assisted by Malcolm Coulter and Richard Marquardt of the Unit staff. During the nest hunting work, special assistance also was given by Graduate Assistant Robert Weeden, by State Regional Biologist Henry Carson, by State Game Warden Lawrence Caron, by Eldon Clark, Biologist of the Moosehorn National Wildlife Refuge, by John Dudley of Calais, and by J. William Peppard of Holden.

These investigations have been conducted for 17 consecutive years. Coverage and techniques in 1955 were essentially the same as in previous years although a few changes were made in the specific areas used for censusing. Several areas which did not lend themselves well to breeding pair counts, or which were too time consuming to cover, or on which good brood counts could not be made have been eliminated; also a few new study areas have been added. In such cases previous figures have been adjusted to permit direct comparison with the 1955 data.

The study areas are located in northern, central and eastern Maine and are believed to be quite representative of this broad section of the State. The principal species of breeding game ducks are the black duck and the ring-neck. (Southern Maine, where wood ducks are more common, and western Maine, where the goldeneye is a regular breeder, are not included in these studies.) Waterfowl habitat sampled consisted of four general fresh-water types: (1) sedge-meadow marshes, (2) bogs, (3) swamps, and (4) large rivers.

The studies consist of three phases: (1) a count of pairs and territorial males prior to and during the early part of the breeding season; (2) a sample nesting study to determine nesting conditions and success; (3) brood counts commencing with the beginning of the hatching period.

Breeding Populations

Waterfowl populations at the start of the 1955 breeding season appeared to be quite satisfactory. Black ducks were slightly decreased on the study areas for the second consecutive year, but the loss was so small (five percent) as to have little or no significance. This loss occurred entirely in eastern Maine; little

change from last year was recorded in the northern and central portions of the State. By contrast, the ring-necked duck showed a substantial increase which was very gratifying after its decrease of the past two years.

Both the blue-winged and the green-winged teal likewise appeared to be increased. Little change was noted for the goldeneye. However, these latter three species do not occur in sufficient numbers on the study areas to permit accurate measurement.

Only the wood duck showed an unsatisfactory trend. A decline of 26 percent was recorded this year; this followed an 18 percent decrease a year ago and a 31 percent loss in 1953. Even though Unit study areas do not include the important wood duck habitat in the southern and southwestern counties, this diminishing trend may be viewed with some concern.

Complete census data by study areas are presented in Table I. In summary, the status of the initial population of the six species of breeding game ducks is as follows:

<u>Species</u>	<u>Status in 1955</u>
(Measured on Census Areas)	
Ring-necked Duck	14% Increase
Black Duck	5% Decrease
Wood Duck	26% Decrease
(Estimated)	
Blue-winged Teal	Moderate Increase
Green-winged Teal	Slight Increase
American Goldeneye	No Change

#### General Breeding Conditions

From the standpoint of water levels, phenology, and climatic conditions, an excellent breeding season occurred. This is a distinct contrast to the retarded spring and the greatly fluctuating water levels of a year ago.

The entire 1955 migration and nesting season, phenologically, was about two weeks ahead of last year. The break-up of ice was at near average dates as was the start of nesting for most species--an exception was noted in the ring-necked duck which nested earlier than usual. Hatching peaks, as calculated from both nest and brood data, were advanced over last year as well as over the long-term average. The black duck hatching peak was approximately June 2, 10 days ahead of 1954 and a week earlier than the 17-year average. The hatching peak for the wood duck was calculated as June 12 which is eight days earlier than last year. The ring-neck peak occurred about June 24, eight days ahead of 1954

and 10 days ahead of the long-term average. The earliest hatching date recorded for the ring-neck in the 17 years of these studies (on June 7) occurred this year.

Water levels were moderately high at the start of nesting, with a very gradual run-off, and with no serious floods. A drought occurred during July and water levels dropped throughout the last half of the summer; however, by then the majority of the broods were of a Class II or Class III age and no adverse effects were noted.

#### Nesting Success

During the nesting study a total of 76 nests were located. All but four of these were of the two most important species in Maine--the black duck and the ring-neck.

A total of 73 of the nests found were kept under observation until hatched or destroyed. Based on this sample, 56 of which hatched with 20 being failures, nesting success was 73 percent. This indicates a very successful nesting season. The figures for both the black duck and the ring-neck were substantially higher than the long-term average.

In contrast to 1954 when the mink was the principal nest predator, the majority of losses this year were equally divided between raccoons and crows. Flood losses were unusually low.

Further indications that 1955 was a successful nesting season were seen in the fact that clutch sizes were larger than usual, fewer renests were found, and the average size of black duck broods in the downy stage was the highest in 17 years.

#### The Brood Season

Data from brood counts are given in Table II. Figures were obtained on 190 complete broods which were classified by age. They show that the 1955 brood sizes for all species in all three age classes were noticeably higher than usual. A single exception occurred in Class I ring-necks which averaged 7.6 a year ago and 7.4 this year. Despite this, brood figures for Class III ring-necks were almost a full bird higher this year (6.8 as contrasted with 5.9 in 1954). Black ducks likewise showed an appreciable gain in the Class III average (5.9 in 1954 and 6.6 in 1955), but all three age classes of black ducks were noticeably above last year's figures.

### Conclusions

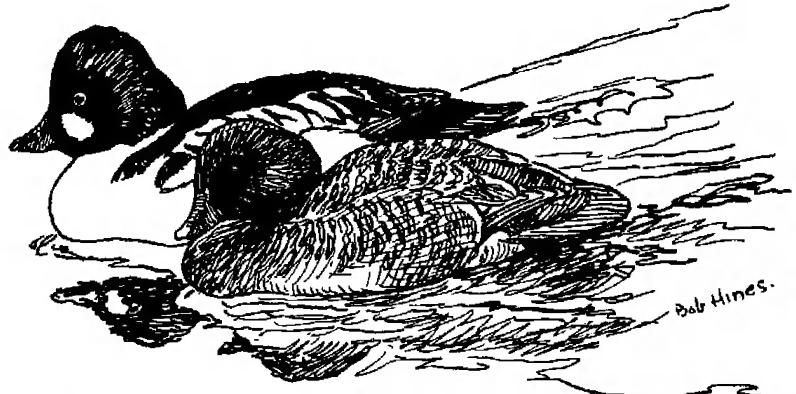
1. Over-all waterfowl populations were similar at the start of the 1955 nesting season to those of a year ago. A substantial increase occurred for the ring-necked duck. A noticeable decrease was indicated for the wood duck for the third consecutive year. A very slight decrease was noted in the black duck, but this is not believed to be of significance.
2. Weather conditions and water levels were much more favorable for nesting ducks than they were a year ago.
3. Nesting success was somewhat better than average, and much higher than in 1954, for both the black duck and the ring-neck.
4. Hatching peaks were considerably advanced from last year and were earlier than the 17-year average.
5. Brood count averages were unusually high for all species and indicated a very successful rearing season.
6. Considering all aspects of the 1955 breeding season, it is believed that waterfowl productivity in northern, eastern, and central Maine was materially increased over that of 1954.

**Table I. - Waterfowl Census Data (Number of Breeding Pairs).**

Study Area	Black Ducks		Ring-necked Ducks		Wood Ducks	
	1954	1955	1954	1955	1954	1955
St. John River, Van Buren-Madawaska	7	9	-	-	5	4
Portage Lake, Portage	8	5	15	16	2	1
Meduxnekeag Stream, Hodgdon	4	3	-	-	2	1
Pocamoonthine-Crawford Lakes	25	32	40	45	3	4
St. Croix River, Calais-Baring	10	9	-	-	3	1
Barn Meadow, Calais	14	12	6	4	-	-
Magurrewock Stream, Calais	20	13	3	2	-	-
Moosehorn Stream, Baring	6	3	-	-	-	-
Cranberry Lake, Baring	-	-	1	3	2	1
Boyden Lake, Perry	2	3	3	4	2	1
Pennamaquan River, Pembroke	3	4	13	18	-	-
Great Works Marsh, Edmunds	10	6	8	10	1	2
Scammon Pond, Eastbrook	6	7	6	6	2	0
Penobscot River, Lincoln-Enfield	15	16	-	-	8	6
Davis-Holbrook Thoroughfare, Eddington	4	6	0	4	-	-
Snake Pond, Brooksville	-	-	4	3	-	-
Goose River, Belfast-Swanville	18	16	22	23	1	1
Ruffingham Meadow, Searsmont	-	-	-	-	4	4
<b>Totals of 18 Areas</b>	<b>152</b>	<b>144</b>	<b>121</b>	<b>138</b>	<b>35</b>	<b>26</b>

**Table II. - Average Brood Size by Age Classes.**

Species	Total Broods	Class I		Class II		Class III	
		Broods	Average Size	Broods	Average Size	Broods	Average Size
Black Duck	70	23	8.1	21	6.9	26	6.6
Ring-necked Duck	100	40	7.4	34	7.1	26	6.8
Wood Duck	13	6	8.2	4	6.0	3	7.0
Am. Goldeneye	6	3	7.7	1	6.0	2	6.5
Blue-winged Teal	1	-	-	1	7.0	-	-
Total	190	72	7.7	61	7.0	57	6.7



## WATERFOWL BREEDING GROUND SURVEY IN THE NORTHEASTERN STATES,

1955

Francis B. Schuler

### Introduction

The waterfowl production information in this report is based on the opinions and data of the Fish and Wildlife Service and State personnel and private cooperators. It was collected and compiled in the same manner as in previous years.

### Weather and Water Conditions

The early spring in New England, central and northern New York, and portions of West Virginia was seasonally cold and rainfall slightly above normal. Water levels declined gradually through early summer. Floods and rising waters were either absent or local in nature. In July the water levels were dropping rapidly over much of the area. Sub-normal amounts of rainfall occurred from southwestern Connecticut southward to Delaware. Water levels in this area were far below seasonal average. The usual high tides occurred in the coastal areas.

Throughout the entire Northeast it was the common opinion that the season was approximately two weeks earlier phenologically than last year.

### Breeding Population Trends

Observer reports indicated a breeding population similar to last year and in some areas better. They also stated nesting was at least two weeks ahead of the 1954 season throughout the Northeast. There was general agreement that the nesting and rearing seasons were near ideal, with the late drop in water levels not seriously affecting brood survival. Reports from the coastal areas state that due to the early nesting season, the normal high tides occurring in June did not seriously affect production since most of the broods were off prior to high water. Renesting attempts are reported to be few in number.

### Brood Production

The summary of production data from 123 comparable areas is shown in Tables I and II. No important change is indicated in the data from last year. Increases in the average brood size of the dabblers may reflect the good

rearing conditions. The mallard continues to increase in numbers in the Northeast. This year the ring-necked duck appears in the tabulation, reflecting the general observed trend of expanding and increasing its breeding range and density.

#### Summary

No significant changes in production are noted in the principal breeding species, the black duck and wood duck. The variations noted in Table II do not appear important.

Table I. - Number of Comparable Areas by States Showing Status of Production.

State	Comparable Areas	Increase	No Change	Decrease
Connecticut	35	12	5	18
Delaware	2	1	0	1
Maine	38	14	7	17
Massachusetts	5	2	0	3
New Hampshire	7	4	2	1
New Jersey	4	2	0	2
New York	17	8	3	6
Rhode Island	12	4	0	8
Vermont	1	1	0	0
West Virginia	2	1	1	0
Total	123	49	18	56

Table II. - Summer Brood Survey in the Northeastern States, 1955, (123 Comparable Areas).

Species							Percent of Change			
	Total Broods		Yng. Produced		Average Brood		Yng. Produced		Broods	
	1955	1954	1955	1954	1955	1954	In-crease	De-crease	In-crease	De-crease
Black Duck	342	338	2186.3	2005.2	6.4	5.9	9.0	-	1.2	-
Wood Duck	228	245	1502.	1579.3	6.6	6.4	-	4.8	-	6.9
Ring-necked Duck	36	33	226.4	214.7	6.3	6.5	9.1	-	5.4	-
Mallard	78	71	560.9	429.6	7.2	6.1	30.6	-	9.9	-
Blue-winged Teal	19	23	107.3	155.1	5.6	6.7	-	30.8	-	17.4